



### DECLARATION OF ACADEMIC INTEGRITY

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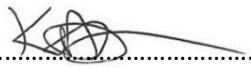
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ACADEMIC YEAR 2020-2021**

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A systematic review examining the associations between maternal body image and breastfeeding intention, infant feeding behaviour, and breastfeeding duration.

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10<sup>th</sup> August 2021

Submitted in partial fulfilment of the Doctorate in Clinical Psychology  
University of Liverpool

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## **Introductory Chapter: Thesis Overview**

This thesis explores breastfeeding behaviours and factors associated with women meeting their own breastfeeding goals, including antenatal infant feeding information, social comparison, maternal mental health and body image. The introductory chapter presents a brief contextual overview of breastfeeding behaviours in the UK, the current literature regarding breastfeeding, social media and body image, and the rationale for the current investigation. Presented next are two papers with common themes throughout. A systematic review of the association between maternal body image and breastfeeding outcomes (Chapter 1) is followed by an empirical research paper examining the associations between social comparison, breastfeeding intention and behaviour, Baby Friendly Initiative (BFI) antenatal feeding information, and maternal mental health.

### **Background Literature**

Breastfeeding is linked to positive health outcomes for both mother and baby (Victora et al., 2016) with the World Health Organisation (WHO) recommending exclusive breastfeeding for the first six months and continued breastfeeding up to two years (WHO, 2015). However, just 1% of UK mothers achieve exclusive breastfeeding to 6 months and the majority do not meet their own breastfeeding goals (McAndrew, et al., 2012). The BFI, part of a global partnership between the World Health Organization (WHO) and UNICEF, aims to enable services to better support families with breastfeeding. The BFI has proved successful in increasing breastfeeding initiation rates in the UK, with more women choosing to offer at least one breastfeed in the early postpartum period but does not appear to have had the same effect on rates of continued breastfeeding (Fallon, Harrold, & Chisholm, 2019). Midwives discuss infant feeding with expectant mothers at around 28 weeks gestation but the guidance

on the balance of information pertaining to breast and formula feeding is unclear. Many have criticised the idealistic nature of antenatal breastfeeding information that sets women up to fail (Fallon et al., 2019; Hall, McLelland, Gilmour, & Cant, 2014; Hoddinott et al., 2012), meaning that they are both unprepared for the challenges of breastfeeding and unarmed with sufficient knowledge of safe formula feeding practices (Lakshman, Ogilvie, & Ong, 2009).

The rise in social media engagement has meant that the lives and experiences of others are more accessible than ever. Mothers are no exception to this (Duggan, Lenhart, Lampe, & Ellison, 2015) and sites aimed at parents attract millions of visitors per month. Social comparison theory (Festinger, 1954) states that when met with information about others, people often engage in social comparison, “the desire for information about others, and explicit self-evaluation against others” (Taylor & Lobel, 1989). Social comparison on social media has been associated with symptoms of depression (Nesi & Prinstein, 2015), which we know is associated with early breastfeeding cessation (Stark, Shim, Ross, & Miller, 2018).

Research indicates that social comparison is strongly, positively associated with body dissatisfaction (a component of body image relating to dissatisfaction with specific body features; Myers & Crowther, 2009). The relationship between social comparison and body dissatisfaction is significantly stronger in women, compared to men, and is inversely associated with age (Myers & Crowther, 2009). Most research in this area has focussed on adolescents (Holland & Tiggemann, 2016) but literature regarding women in the perinatal period, when (like in adolescence) their bodies are changing rapidly, is increasing. Many studies focus on Body Mass Index (BMI) and breastfeeding due to the significant association between body image and weight-related behaviours (Shagar, Harris, Boddy, & Donovan,

2017). However, associations are complex as breastfeeding is linked with postpartum weight loss, but rates of initiation and maintenance are low in obese/overweight mothers (Lyons, Currie, Peters, Lavender, & Smith, 2018). This is further complicated by increasing body image dissatisfaction in the postnatal period (Rallis, Skouteris, Wertheim, & Paxton, 2007). It is important to know more about the associations between social comparison and body image in the perinatal period and how, along with antenatal feeding support, these constructs affect breastfeeding outcomes and maternal mental health. This study aims to do this through a synthesis of the relevant literature and an empirical research project involving women making the transition to motherhood.

Firstly, in chapter 1; ‘A systematic review examining the association between maternal body image and breastfeeding intention, infant feeding behaviour, and breastfeeding duration’, existing literature is reviewed and synthesised. This expands on and updates an existing systematic review by Morley-Hewitt & Owen (2020) whilst amending several issues with its protocol, as outlined in a commentary paper by Bigman, Homedes, & Wilkinson (2019). Secondly, there follows an empirical examination of the associations between social comparison, breastfeeding behaviour and outcomes, and maternal mental health in chapter 2; ‘Antenatal feeding information and postnatal feeding experiences: The relationship between the breastfeeding intention-behaviour gap, maternal mental health and online social comparison’. This prospective study had two broad aims. The first was to understand more about the relationship between maternal antenatal infant feeding intentions and expectations, information received during the 28-week BFI feeding discussion and breastfeeding outcomes. The second was to explore how first-time mothers engage with social media and how this is associated with social comparison, maternal mental health, and infant feeding experiences.

Outcomes aim to inform future development of breastfeeding and mental health support services for women in the perinatal period to help them to achieve their breastfeeding goals.

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**A systematic review examining the association between maternal body image and  
breastfeeding intention, infant feeding behaviour and breastfeeding duration.**

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Chapter 1: Systematic Review

Kate Abbott

## **Abstract**

Body image has been widely studied in women and adolescents and is known to be associated with weight-related behaviours. Less is known about body image in pregnancy, when significant changes to body shape and size occur, and how this informs infant feeding decisions and outcomes. A recent systematic review by Morley-Hewitt & Owen (2020) examined ‘the association between female body image and the intention, initiation and durations of postpartum infant feeding methods (breastfeeding vs. bottle feeding)’. A subsequent commentary paper identified several issues with the protocol and search strategy of this review, identifying a further eight relevant studies that were omitted (Bigman, Homedes & Wilkinson, 2019). The current systematic review was conducted to update the original review and address its limitations. Electronic searches were performed in relevant databases in addition to hand searches of reference lists of included articles. Search returns were reviewed via a three-stage screening process and quality assessment and data extraction were conducted by the author, identifying 19 eligible studies. This systematic review identified mixed findings concerning the association between body image and breastfeeding intention, behaviour and duration. This contrasts with the findings of Morley-Hewitt and Owen (2020) and corroborates the appraisal of Bigman et al., (2019). The review was limited by the heterogeneity of body image measures and a lack of a second researcher involved in the quality assessment. It is concluded that further research is needed, using standardised measures of body image specific to pregnancy or the perinatal period, to further clarify these associations.

**Keywords: breastfeeding, body image, infant feeding, pregnancy, systematic review**

## **Introduction**

Breastfeeding is widely accepted to be the ‘gold standard’ method of infant feeding in terms of nourishment and optimal growth (Victora et al., 2016). The World Health Organisation (WHO) recommends that breastfeeding should be initiated within an hour of birth and that infants should be exclusively breastfed for the first six months and offered breastmilk for the first two years and beyond (WHO, 2015). Whilst rates of breastfeeding initiation are high in many high-income countries, the number of infants who are breastfed exclusively for 6 months, or offered any breastmilk for longer, falls far below the WHO recommendations (Victora et al., 2016). This is despite the known long and short-term health benefits for both mother and infant (Rollins et al., 2016; Victora et al., 2016). Research suggests possible reasons for this incongruity between initiation and continuation of breastfeeding include high-risk pregnancy, assisted delivery, maternal illness, prematurity or low birth weight, and hospital practices detrimental to successful initiation (Cohen et al., 2018; Rollins et al., 2016). The two to three weeks following birth is a key time for intervention as breastfeeding cessation risk factors peak and make women particularly vulnerable to supplementation or early weaning from the breast (Rollins et al., 2016). An understanding of the social, psychological and practical reasons for this is imperative in enabling development of interventions that empower mothers to meet their own infant feeding goals and that foster benefits to public health associated with breastfeeding (Binns, Lee, & Low, 2016).

Becoming a mother is a major life event that necessitates ever-evolving psychological, social, physical and emotional adjustments to attachment relationships, identity, role and almost every element of life (Shloim et al., 2020). These numerous shifting

variables make studying the process of decision making and the mechanisms between intentions and behaviour difficult during this period due to the flux in these variables (Ogden, 2016). This is especially problematic for research regarding the current infant feeding culture in the UK, where the majority of mothers do not meet their own breastfeeding goals (McAndrew et al., 2012). Research indicates that infant feeding decisions are generally established by the third trimester (Rollins et al., 2016) and often made before conception or early in the first trimester (Roll & Cheater, 2016). Whilst infant feeding information is offered by health care providers and maternity services, the input of family, peers and social media is also highly influential. To best support women to meet their own breastfeeding goals and to equip mothers with evidence-based information, services must identify which of these factors are most readily modifiable and target these for intervention.

Body image, the ‘loose, subjective representation of one’s body’ (Slade, 1994), has been widely studied, particularly in women and adolescents. Research has found a significant association between body dissatisfaction (a component of body image) and weight-related behaviours such as preoccupation with weight, eating disorders, weight-loss/restricting behaviours and weight-control (Shagar, Harris, Boddy, & Donovan, 2017). During pregnancy, associations between body image and weight have also been found, with women reporting body dissatisfaction being at increased risk of excessive pregnancy weight gain (Mehta, Siega-Riz, & Herring, 2011; Sui, Turnbull, & Dodd, 2013). However, there is also evidence that one’s own body image is deprioritised by women in pregnancy as perceived health and body function takes precedence (Watson, Fuller-Tyszkiewicz, Broadbent, & Skouteris, 2015). This may go some way to account for the finding that body image in pregnancy is relatively stable (Skouteris, Carr, Wertheim, Paxton, & Duncombe, 2005).

Body dissatisfaction is consistently associated with perinatal depression (Silveira, Ertel, Dole, & Chasan-Taber, 2015), which is associated with shorter breastfeeding duration but not with breastfeeding intention (plans/commitment to breastfeeding prior to birth) or initiation of breastfeeding (Dias & Figueiredo, 2015). Whilst body image in pregnancy is relatively stable, women are most likely to report body dissatisfaction in the early to mid-second trimester (Skouteris et al., 2005). Research indicates that body image dissatisfaction increases in the postnatal period, exceeding that experienced in pre and late pregnancy (Rallis, Skouteris, Wertheim, & Paxton, 2007). This could be due to women feeling pressure to regain their pre-pregnancy body shape in an unrealistic timeframe because of images portrayed in the media or because of perceived internal or external expectations (Gow, Lydecker, Lamanna, & Mazzeo, 2012). Women in the perinatal period have also reported feelings of dissatisfaction with their body as a result of comparing their bodies with postpartum bodies portrayed in the media (Liechty, Coyne, Collier, & Sharp, 2018).

Before the advent of social media, magazines and television were presenting women with images of unattainable slenderness and female body shape ideals (Fardouly & Vartanian, 2016) that have been associated with increased body dissatisfaction on the part of women in the general population (Tiggemann & McGill, 2004; Tiggemann & Slater, 2004). Social media is no different except in its omnipresence. Body concerns (concerns about body shape and weight) have been shown to be positively associated with exposure to media images and Facebook usage (Fardouly & Vartanian, 2015; Grabe, Ward, & Hyde, 2008). Although the relationship between social comparison and body dissatisfaction is present in men, it is significantly stronger in women and inversely associated with age (Myers & Crowther, 2009). Most of the research in this area focuses on adolescent girls and young

women, at an age when they are experiencing changes to their bodies (Holland & Tiggemann, 2016).

Breastfeeding very visibly puts the mother's body at the centre of childcare. Narratives around the effects of breastfeeding on the body are mixed, with some mothers worrying about breastfeeding damaging breast aesthetics (Rinker, Veneracion, & Walsh, 2008) and others heralding the expedited postpartum weight loss associated with breastfeeding (Jarlenski, Bennett, Bleich, Barry, & Stuart, 2014). There are also new mothers with weight concerns who find themselves unable to meet their breastfeeding goals. Indeed, a recent review of the literature revealed great heterogeneity across studies but found the pooled risks of non-initiation in overweight/obese women to be significant (Nomura, Minamizono, Nagashima, Ono, & Kitano, 2020). That is, overweight/obese women are less likely to initiate breastfeeding compared to healthy-weight women. It is important to understand more about the relationship between body image in the perinatal period and breastfeeding. Specifically, about how different maternal demographics, body image measures and timing of body image measurement affect breastfeeding outcomes to enable services to support mothers to make informed and achievable feeding decisions.

A systematic review conducted by Morley-Hewitt & Owen (2020) examining “the association between body image and infant feeding methods (breastfeeding vs. bottle-feeding)” identified and synthesised nine relevant articles. As seven of these found a direct positive relationship between body image and breastfeeding intention, behaviour and/or maintenance, the authors concluded that exclusive breastfeeding was more likely in women who reported high body image in pregnancy and that women with body concerns had lower levels of breastfeeding intention, initiation and duration. However, a commentary by Bigman

and colleagues (2019), based on an earlier ahead of print ePublication of Morley-Hewitt & Owen's (2020) review, highlighted that at least a further eight peer-reviewed articles had been missed. The authors also identified several issues that may have led to selection bias. These included inconsistent breastfeeding definitions, a lack of a comprehensive search strategy, missing numbers regarding duplicates and specific database search returns, failing to search EMBASE or the reference lists of relevant papers, failing to adhere to the PRISMA statement for reporting systematic reviews, and not adequately describing a quality assessment method. Within the search strategy, essential search terms were identified as missing, including 'breastfeeding', 'lactation', 'formula' and " various concepts related to body image that capture a range of attitudes towards the physical self, such as body weight, shape, size and body appearance" (Bigman et al., 2019).

The current systematic review aimed to examine the relationship between body image and breastfeeding intention, infant feeding behaviour, and breastfeeding duration, and in doing so, overcome the review limitations described by Bigman and colleagues (2019). The review will also update the existing systematic review (Morley-Hewitt & Owen, 2020) by searching for literature published since the initial searches in August 2018.



## **Method**

A protocol was developed based initially on the work of Morley-Hewitt & Owen (2020). Changes to the original protocol were guided by the issues raised by Bigman and colleagues (2019) about the original systematic review (Morley-Hewitt & Owen, 2020), as described above. This involved adherence to the following recommendations:

- consistent breastfeeding definitions in terms of initiation, duration and infant feeding behaviours
- a comprehensive search strategy
- inclusion of numbers regarding duplicates and specific database search returns
- search of EMBASE (Scopus was used as this contains the same database literature)
- search of reference lists of relevant papers for additional studies
- adherence to the PRISMA statement for reporting systematic reviews
- adequate description of quality assessment methodology

### **Eligibility criteria**

The current review does not include studies conducted in developing countries where the cultures and factors affecting both breastfeeding decisions and body image contrast so markedly with those in developed countries (Stuart-Macadam, 2017; Swami, 2018).

Developed countries were selected based on definitions in the World Economic Situation and Prospects 2020 document (United Nations, 2020). The search strategy and eligibility criteria in line with PICOS criteria (Population, Intervention, Comparison, Outcomes and Study; Sayers, 2008) is described below and tabulated in Appendix 1. English language,

quantitative, peer reviewed studies or doctoral theses carried out in developed countries were included, where they reported on infant feeding and maternal body image in women  $\geq 18$  years old. Excluded studies were those involving males/fathers, health professionals, adoptive mothers, or infants with a medical condition known to affect feeding. Studies of mothers with a current eating disorder/body dysmorphic disorder, severe and/or current mental health difficulties or whose infant feeding decision would be based on specialist clinical advice, were also excluded. Articles were screened according to the eligibility criteria.

### **Information Sources**

Eight databases (MEDLINE, PsychINFO, Scopus, Cumulative Index to Nursing and Allied Health Literature [CINAHL] Plus, Web of Science, PUBMED, Global Health Archive, ProQuest Dissertations & Theses Global) were searched from date of inception to current day. EMBASE was not searched as Scopus includes the same database of literature, just without the specialist Emtree thesaurus terms.

### **Search Strategy**

Databases were searched for the terms: (Mother\* OR Maternal) AND (Breast\*Fe\* OR "Infant Feeding" OR "Formula Fe\*" OR "Bottle Fe\*" OR Bottlef\*d OR "Infant Feeding Behavior?" OR "Infant Feeding Intent\*" OR "Exclusive\* Breastfe\*" OR "Artificial Milk Feeding" OR Lactation OR "Breast Milk" OR "Human Milk") AND ("Body Image" OR "Body Satisfaction" OR "Body Dissatisfaction" or "Positive Body Image" OR "Negative Body Image" OR Self-Image OR "Body Weight" OR "Body Shape" OR "Body Size" OR "Body Appearance" OR "Body Representation" OR "Body Schema" OR Appearance OR

“Body Concern\*” OR “Body Attitude” OR Self-Perception). The literature search was conducted in October 2020.

Studies where the abstract was available in English, but the full paper was not, were excluded at a later stage as it was not possible to fully understand the methodology and complete a quality assessment. Animal studies were excluded during the process of title searching and subsequent selection phases.

## **Study Selection**

Once duplicates were removed, study selection progressed through a 3-stage screening process: title, abstract, then full-text. Reasons for each decision to progress or exclude a study, from the abstract stage onwards, were recorded in the review database (see Figure 1 for details). Studies identified through reference lists of relevant studies were subject to the same 3-stage selection process. Where there were doubts as to the suitability of a study, progression to the next stage for more in depth checks was permitted.

A Prisma checklist can be found in Appendix 2.

## **Data Extraction**

Data were extracted from the included studies by the author, using a data extraction table based on other systematic reviews with infant feeding as the outcome (Chang, Glaria, Davie, Beake, & Bick, 2020; Fallon, Harrold, & Chisholm, 2019). Data extracted included aim, study design, sample, breastfeeding measure, body image measure, follow-up, and

summary findings (see Table 1). Test statistics were not consistently reported in the reviewed studies so, for consistency, only p values were reported.

## **Quality Assessment**

All studies were quality assessed independently by KA using an adapted version of the Critical Appraisal Skills Programme (CASP) checklist (CASP UK, 2017) as have been used previously in reviews of the breastfeeding literature (Fallon, Harrold, & Chisholm, 2019). The CASP cross-sectional/observational and before and after intervention studies checklists, and adapted versions of the CASP cohort study checklist, were used. The quality assessment was used to discuss the synthesis in terms of quality in the discussion.

The studies had a total of 66,587 participants, ranging from 38 to 55,522 per study. Seven studies included information about power analyses derived from their sample sizes (de Jager, Broadbent, Fuller-Tyszkiewicz, & Skouteris, 2014; de Jager et al., 2015; Han & Brewis, 2018; Mancini, 2017; Sperry, 2011; Swanson, Keely, & Denison, 2017; Welsh, 2009), while 12 studies provided no information on sample size calculations (Barnes, Stein, Smith, Pollock, & Study, 1997; Brown, Rance, & Warren, 2015; Foster, Slade, & Wilson, 1996; Gjerdingen et al., 2009; Hauff & Demerath, 2012; Hughes, 1984; Johnson-Young, 2019; Rodgers, O'Flynn, Bourdeau, & Zimmerman, 2018; Toolsie, 2000; Walker & Freeland-Graves, 1998; Zanardo et al., 2014; Zimmerman, Rodgers, O'Flynn, & Bourdeau, 2019). Where power analyses were not reported, sample sizes were small-moderate and/or confidence intervals were large or not reported, studies were classified as “can’t tell” in the CASP appraisal (CASP UK, 2017) with regards to whether the results could be believed (see Table 2). Of the seven studies which included information about statistical power, four

achieved the required sample size (de Jager et al., 2014; Mancini, 2016; Swanson et al., 2017; Welsh, 2009) and two did not, so should be interpreted with caution (de Jager et al., 2015; Sperry, 2011). Han and Brewis (2018) did not include a power calculation but highlighted that their large Norwegian Mother and Child Cohort Study (MoBa) sample ( $n= 55,522$ ) had high statistical power sufficient “to detect a relatively small mediation effect”.

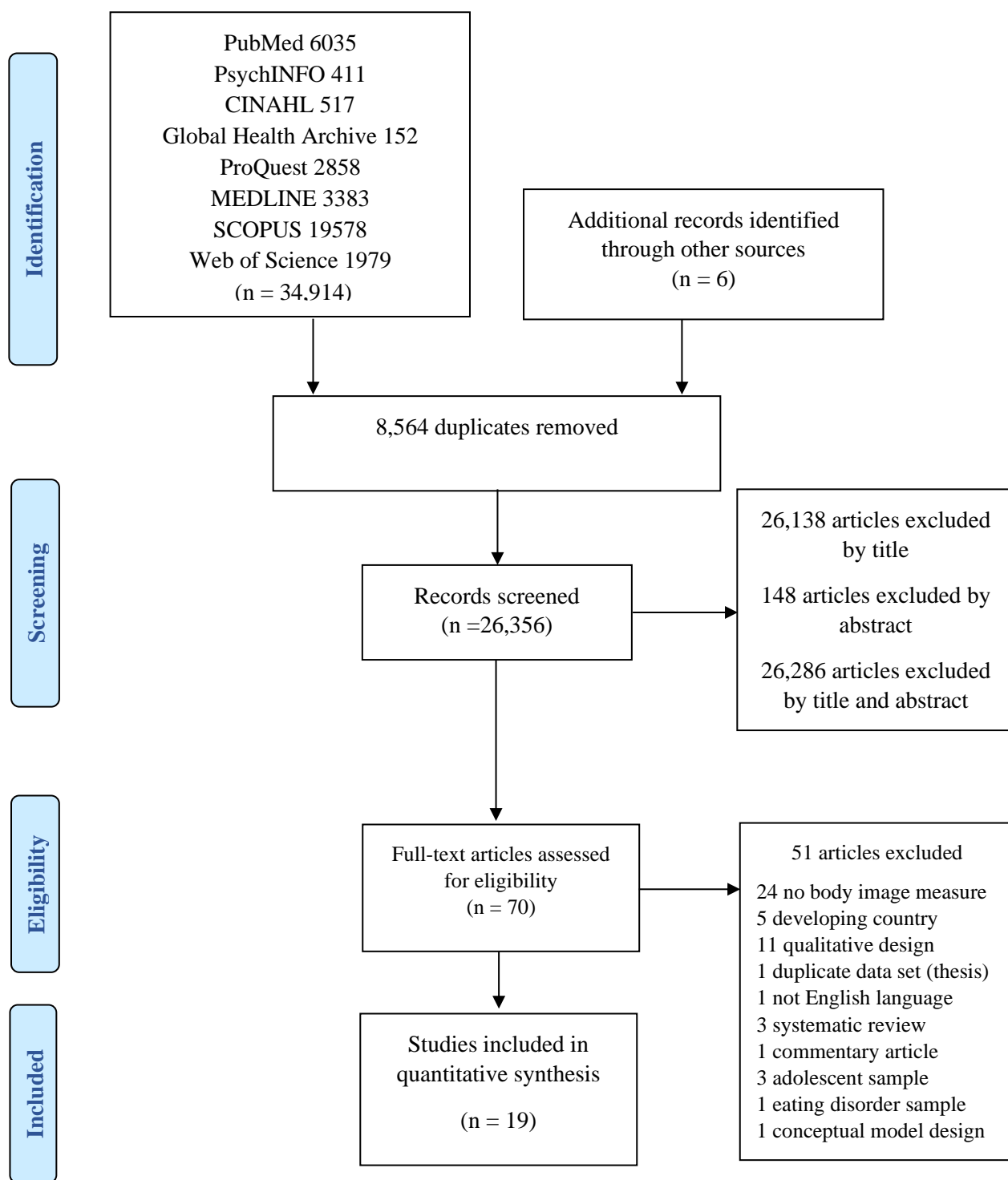


Figure 1. PRISMA flow diagram for searches and study selection

## Results

Database searches and study selection was undertaken by the author KA (doctoral student). The search yielded 34,914 results, removal of 8,564 duplicates left 26,356 articles to which inclusion criteria were applied (see Figure 1). The current review identified 19 studies matching the inclusion criteria (see Table 1 for a summary of the characteristics of these studies). The included studies were carried out between 1980 and late 2016 with publication dates ranging from 1984 to 2019. The studies were conducted in several developed countries: eleven in the USA, four in the UK, two in Australia, one in Italy and one in Norway. Eight studies were longitudinal in design and eleven were cross-sectional.

Participants were recruited from maternity wards, antenatal or paediatric clinics (Foster et al., 1996; Gjerdingen et al., 2009; Han & Brewis, 2018; Hauff & Demerath, 2012; Mancini, 2017; Sperry, 2011; Swanson et al., 2017; Toolsie, 2000; Zanardo et al., 2014), through online advertising (de Jager et al., 2014; Johnson-Young, 2019; Rodgers et al., 2018; Welsh, 2009; Zimmerman et al., 2019), local Lamaze, antenatal or mother-infant classes (Brown et al., 2015; Hughes, 1984), newspaper birth announcements (Walker & Freeland-Graves, 1998) or through a combination of advertising in the media and antenatal clinics (de Jager et al., 2015).

Table 1

*Summary table of studies included in the systematic review*

Study ID (reference)	Study Aim	Design	Sample (location, size, attrition)	Breastfeeding measure	Body Image measure	Follow up	Summary findings
Barnes, Stein, Smith, & Pollock (1997).	To determine whether factors known to be related to feeding behaviour applied to prenatally expressed feeding intentions. To investigate the relevance of psychological factors to prenatal reluctance to breast feed.	Cross-sectional	ALSPAC sample at 32 weeks gestation UK  n= 8341 - first week feeding intention n= 8392 – four month intention	Breastfeeding intention (in the first week and first month).	Eating Disorder Examination Questionnaire (EDE-Q; (Mond, Hay, Rodgers, Owen, & Beumont, 2004). Five items from the 'Shape Concern' & five items from the 'Weight Concern' subscales. Measured in pregnancy (32 weeks gestation)	None	<ul style="list-style-type: none"> <li>Body image was a significant predictor of breastfeeding intentions - the relative odds of intending to breastfeed during the infant's first week was 1.25 times higher for women with no concern over their body image than for women who had marked concerns. <i>Intention to bf infant 1 week old infant:</i> Shape concern normal OR 1.25 (95%CI: 1.09, 1.42) <i>Intention to bf infant up to 4 months:</i> Shape concern normal OR 1.26 (95%CI: 1.13, 1.42)</li> </ul>
Brown, Rance, & Warren (2015).	To explore body image concerns in first time pregnant women and examine their association with later breastfeeding initiation and duration.	Longitudinal	Primiparous women in the second or third trimester of pregnancy UK  n= 128	Breastfeeding intention, duration, breastfeeding cessation questionnaire.	Questionnaire specific to study - items based on current body image during pregnancy literature and discussion with mothers regarding body issues around breastfeeding. Measured in pregnancy (13-42 weeks gestation)	T1 = 13-24 weeks gestation T2 = 6 months postpartum (asking about breastfeeding at 2, 6, 12 & 26 weeks)	<ul style="list-style-type: none"> <li>Body image during pregnancy predicts both intended (p=.007) and actual breastfeeding duration (p=.000) ; higher body image concerns are associated with formula use.</li> <li>This relationship is not explained by weight alone.</li> <li>Prospective postnatal body image concerns are associated with stopping breastfeeding due to concerns about public feeding (p=.000).</li> <li>Perceptions of breastfeeding and its impact on appearance affect breastfeeding duration.</li> </ul>
de Jager, Broadbent, Fuller-Tyszkiewicz, & Skouteris (2014).	To compare women who do/do not exclusively breastfeed to six months postpartum on a range of psychosocial variables. To evaluate conceptual model of psychosocial correlates of exclusive breastfeeding duration	Cross-sectional	Women who had given birth six months to two years prior to participation 64% primiparas  71% Australia 14% USA 15% EU n= 174	Breastfeeding intention and duration.	The Body Attitude Questionnaire (BAQ, short form; (Ben-Tovim & Walker, 1991). Measured between 6-24 months postpartum for retrospective body image at 0-6 months postpartum.	Retrospective questionnaire – pre-pregnancy, during pregnancy, post pregnancy (birth to 6 months)	<ul style="list-style-type: none"> <li>Body image variables (salience of weight and shape, feeling fat, and attractiveness) were not directly associated with comfort breastfeeding in public.</li> <li>Body image variables were significantly correlated with other variables with significant pathways [e.g., pregnancy attitude (p&lt;.05) and postpartum attitude(p&lt;.001), suggesting that the effect of body image on comfort breastfeeding is indirect.</li> </ul>



Study ID (reference)	Study Aim	Design	Sample (location, size, attrition)	Breastfeeding measure	Body Image measure	Follow up	Summary findings
de Jager, Broadbent, Fuller-Tyszkiewicz, Nagle, McPhie, & Skouteris (2015).	To replicate and extend the findings of de Jager et al. (2014) by evaluating a conceptual model of psychosocial predictors using a more robust prospective longitudinal design.	Longitudinal	Pregnant women in third trimester Australia  195 recruited Final n= 122	Exclusive breastfeeding intention, behaviour, and duration at each time point.	The Body Attitude Questionnaire (BAQ, short form; (Ben-Tovim & Walker, 1991). Concurrent measures at 32 weeks gestation and 2 and 6 months postpartum	T1 = 32 weeks gestation T2 = 2 months postpartum T3 = 6 months postpartum	<ul style="list-style-type: none"> <li>Body image variables showed no direct relationship with exclusive breastfeeding duration at any time point.</li> <li>Salience of weight and shape was correlated with psychological adjustment (<math>p&lt;.05</math>), suggesting the effect of body image on breastfeeding outcomes is likely to be through psychological adjustment.</li> </ul>
Foster, Slade, & Wilson (1996).	To make a preliminary examination of the relationship between body satisfaction, maternal foetal attachment, and breast or bottle-feeding plans in pregnancy.	Cross-sectional	Pregnant women between 23-38 weeks gestation UK  50 invited Final n= 38	Breastfeeding intention.	The Body Satisfaction Scale (BSS; Slade, Dewey, Newton, Brodie, & Kiemle, 1990). Eating Disorders Examination (EDE; (Cooper, Z. & Fairburn, 1987) - Shape Concern Concurrent measure at 32-38 weeks gestation.	None	<ul style="list-style-type: none"> <li>Women intending to bottle-feed had a higher level of body dissatisfaction (<math>p=.004</math>).</li> <li>Women intending to bottle-feed had a higher level of shape concerns (<math>p=.02</math>).</li> </ul>
Gjerdingen, Fontaine, Crow, McGovern, Center, & Miner (2009).	To investigate changes in mothers' body dissatisfaction from delivery to 9 months postpartum and the relationship of postpartum body dissatisfaction to weight and other characteristics.	Prospective longitudinal design	Mothers of 0-1 month old infants USA  506 at T1 Final n= 472	Breastfeeding status at (9 months).	8-item Body Shape Questionnaire, Alternate Form 8B (Evans & Dolan, 1993). Concurrent measures at 0-1 and 9 months postpartum	T1 = 0-1 month postpartum T2 = 9 months postpartum	<ul style="list-style-type: none"> <li>Body dissatisfaction at 9 months postpartum was significantly negatively associated with concurrent breastfeeding (<math>p=.009</math>).</li> </ul>
Han, & Brewis (2018).	To test the proposal that body image plays a significant and direct role in breastfeeding among women with high BMI with a very large, longitudinal sample from the Norwegian Mother and Child Cohort Study (MoBa).	Modelling of data from longitudinal sample	Pregnant women (38,026 classified as non-overweight and 17,496 classified as overweight).  Norway n= 55,522	Ever-initiation of breastfeeding, total breastfeeding duration, whether breastfeeding extended beyond six months.	Two interview questions about weight just before pregnancy and concern about putting on more weight during pregnancy. Retrospective pre-pregnancy and pregnancy measures (reported in pregnancy).	T1 = pregnancy T2 = 6 months postpartum T3 = 18 months postpartum	<ul style="list-style-type: none"> <li>Women with greater pre-pregnancy weight concerns had a higher likelihood of initiating breastfeeding, regardless of their weight (overweight, <math>\beta=.016</math>, 95%CI: 0.003, 0.028; healthy <math>\beta=.010</math>, 95%CI: 0.003, 0.018).</li> <li>Compared to normal-weight mothers, overweight/obese mothers, on average, weaned sooner; however, those with greater pre-pregnancy weight concerns, breastfeed for longer (<math>\beta=.016</math>, 95%CI: 0.006, 0.026).</li> </ul>

Study ID (reference)	Study Aim	Design	Sample (location, size, attrition)	Breastfeeding measure	Body Image measure	Follow up	Summary findings
Hauff & Demerath (2012).	To examine whether greater body image concerns are associated with both high maternal BMI and shorter lactation duration	Longitudinal	Primiparous women in third trimester planning to breastfeed. USA  257 recruited Final n= 239	Exclusive breastfeeding duration (weeks) and any breastfeeding duration (weeks)	Body image items adapted from validated questionnaires for use in women (Ben-Tovim & Walker, 1991; Cooper & Fairburn, 1987; Evans & Dolan, 1993). Retrospective pre-pregnancy and pregnancy (reported in 3rd trimester) and concurrent 4 months postpartum measure.	T1 = third trimester T2 = 2 weeks postpartum T3 = 4 months postpartum	<ul style="list-style-type: none"> <li>• Indicating that breastfeeding in public would be avoided as others might see their breasts was a significant negative predictor for duration of exclusive (p=.0002) and any breastfeeding (p=.002).</li> <li>• Women with more concerns about their pre-pregnancy body shape tended to have shorter exclusive (p=.013) and any (p=.0005) breastfeeding duration compared to those with fewer concerns.</li> <li>• Body image did not mediate the relationship between overweight/obese status and breastfeeding duration.</li> </ul>
Hughes (1984).	To determine if there was a difference between body image satisfaction for women who are successful in breastfeeding as compared with those who are not successful.	Longitudinal	Primiparous women in the third trimester USA  n= 44	Breastfeeding “success” at 4 weeks.	The Body Cathexis Scale (Secord & Jourard, 1953). Concurrent measures in 3 <sup>rd</sup> trimester and 4 weeks postpartum	T1 = third trimester T2 = 4 weeks postpartum	<ul style="list-style-type: none"> <li>• Women who were unsuccessful breastfeeders reported slightly greater satisfaction with their bodies than did women who were successful although this difference was not statistically significant.</li> </ul>
Johnson-Young (2019)	To understand communication and body image impacts on health decisions that begin processing during pregnancy, specifically breastfeeding.	Cross-sectional	Pregnant women – 25.6% first, 46.2% second, and 28.2% third trimester. 65% primiparas USA 156 recruited n= 155	Breastfeeding intention - likelihood of breastfeeding exclusively for 3 months, 6 months and 1 year.	The Body-Esteem Scale (Franzoi & Shields, 1984). Retrospective pre-pregnancy (measured in pregnancy) and concurrent pregnancy measures.	None – retrospective questions about body image pre-pregnancy	<ul style="list-style-type: none"> <li>• Pre-pregnancy body satisfaction was found to have a negative relationship to intentions to breastfeed for 3 months (p&lt; .10) and for 6 months (p&lt; .10).</li> <li>• Pregnancy body satisfaction was significant when initially added, but once Theory of Planned Behaviour variables were added, the relationship was no longer present.</li> </ul>
Mancini (2017).	To examine the role of body image and disordered eating about infant feeding decisions in first-time mothers.	Cross-sectional retrospective design	Women 2-6 months postpartum who exclusively breast or bottle fed. USA  n= 66	The Demographic and Breastfeeding History Information profile - including feeding method and breastfeeding history items known to influence feeding intention.	The MBSRQ (Cash, 1990) - Appearance Evaluation Subscale. Concurrent measure 2-6 months postpartum.	None – retrospective questionnaire	<ul style="list-style-type: none"> <li>• No statistically significant difference between breastfeeding and non-breastfeeding mothers on the five subscales of the MBSRQ-AS.</li> <li>• Intention to breastfeed was the best predictor of actual breastfeeding behaviour.</li> <li>• Neither body image nor eating attitudes predicted breastfeeding.</li> </ul>

Study ID (reference)	Study Aim	Design	Sample (location, size, attrition)	Breastfeeding measure	Body Image measure	Follow up	Summary findings
Rodgers, O'Flynn, Bourdeau, & Zimmerman (2018).	To examine an integrated model in which desired weight loss, self-objectification, and depressive symptoms were related to eating disorder symptoms and breastfeeding self-efficacy via body image concerns.	Cross-sectional	Breastfeeding women who had given birth in the last 6 months USA  n= 151	Breastfeeding intention and maintenance Appearance barriers to breastfeeding (measure developed for study)	Body Dissatisfaction subscale of the Eating Disorder Inventory 2 (EDI-2; (Garner, 1991). Concurrent measure 0-6 months postpartum	Retrospective online survey	<ul style="list-style-type: none"> <li>• Appearance barriers to breastfeeding were correlated with higher body dissatisfaction (<math>p&lt;.001</math>) and eating disorder symptoms (<math>p&lt;.001</math>) and lower levels of breastfeeding self-efficacy (<math>p&lt;.01</math>).</li> <li>• Body dissatisfaction was positively correlated with eating disorder symptoms (<math>p&lt;.001</math>) and negatively correlated with breastfeeding self-efficacy (<math>p&lt;.001</math>).</li> <li>• Body surveillance was positively correlated with body dissatisfaction (<math>p&lt;.001</math>) and appearance barriers to breastfeeding (<math>p&lt;.01</math>).</li> </ul>
Sperry (2011).	To examine body image, eating and mood disturbances beyond the immediate postpartum period in mothers of children aged 0-5 years.	Cross-sectional	Mothers who had a child born with the previous five years. 49% had one child. USA  n= 112	Current breastfeeding behaviour.	The MBSRQ (Cash, 1990) - Appearance Evaluation and Body Areas Satisfaction. Concurrent measure - 19.62 months (SD = 17.60) postpartum.	None - Retrospective online survey	<ul style="list-style-type: none"> <li>• Breastfeeding status was not significantly related to body image.</li> <li>• Breastfeeding mums were less likely to endorse eating concerns than their non-breastfeeding counterparts (<math>p&lt;.05</math>).</li> </ul>
Swanson, Keely, & Denison (2017).	To examine how body image influences breastfeeding maintenance, and whether this varies in obese compared with healthy weight women.	Longitudinal	Mothers whose baby's first feed was a breastfeed 70 healthy weight & 70 obese UK  140 recruited Final n= 117	Breastfeeding behaviour – exclusive breastfeeding, mixed feeding or formula feeding	The MBSRQ (Cash, 1990) - Appearance Evaluation, Appearance Orientation and Body Areas Satisfaction subscales. Concurrent measure at 6-8 weeks postpartum used in analyses.	T1 = post birth, prior to hospital discharge T2 = 6-8 weeks postpartum.	<ul style="list-style-type: none"> <li>• All body image components, except appearance orientation correlated with breastfeeding maintenance.</li> <li>• Body satisfaction (<math>p&lt;.001</math>) and appearance evaluation (<math>p&lt;.05</math>) were positively related to breastfeeding.</li> <li>• Body image mediated the relationship between weight and breastfeeding maintenance (<math>p=.002</math>).</li> </ul>
Toolsie, (2000).	To examine variables that influence infant feeding choices in low-income women of colour and whether those concerned about body image tend to bottle-feed.	Cross-sectional	Convenience sample of 100 breast-feeding and 100 bottle-feeding mothers USA  n=200	Current feeding behaviour ('infant feeding choice questionnaire').	The Body Cathexis Scale (Secord & Jourard, 1953) reduced to five categories. Measured concurrently in postpartum period.	None.	<ul style="list-style-type: none"> <li>• Breastfeeders were more comfortable with their body image compared to the bottle-feeders who were closer to being 'neutral' about their body image (<math>p=.002</math>).</li> </ul>

Study ID (reference)	Study Aim	Design	Sample (location, size, attrition)	Breastfeeding measure	Body Image measure	Follow up	Summary findings
Walker, & Freeland-Graves (1998).	To examine whether bottle- and breastfeeding women differ on postpartum weight gain, body image attitudes, or lifestyle.	Cross-sectional	Women 4 months postpartum. 44% primiparas. USA  513 approached, 245 returned Final n= 207	Current infant feeding behaviour (breastfeeding or bottle-feeding).	The Body Cathexis Scale, shortened 29-item form (BCS; (Secord & Jourard, 1953). Concurrent measure 4 months postpartum.	None (see Walker, 1997).	<ul style="list-style-type: none"> <li>No significant differences found between the breast and bottle-feeding groups with regards to body image dissatisfaction score.</li> <li>Bottle-feeding mothers with higher weight gains had greater dissatisfaction with their body image than bottle-feeding mothers with lower gains (<math>p&lt;.05</math>).</li> <li>Breastfeeding women with higher/lower postpartum gain did not differ in body image dissatisfaction, or lifestyle-related variables.</li> </ul>
Welsh (2009).	To investigate the biopsychosocial predictors of body satisfaction and disordered eating behaviours in new mothers during the first year of parenting.	Correlational field study	First-time mothers with children <12months recruited online in USA.  n = 192	Current breastfeeding status, previous breastfeeding.	The Body Shape Questionnaire-Revised-10 (BSQ-R-10; (Mazzeo, 1999). Concurrent measure at 6.63 (SD=3.57) months postpartum.	None – retrospective questions in survey.	<ul style="list-style-type: none"> <li>Women who were currently breastfeeding had higher body satisfaction and reported less disordered eating (<math>p&lt;.01</math>).</li> <li>Breastfeeding provides a “buffer” against the negative effects of pressure for thinness - the interaction of breastfeeding and pressure for thinness was significant when looking at body satisfaction (<math>p&lt;.05</math>) and disordered eating (<math>p&lt;.05</math>).</li> </ul>
Zanardo, Gambina, Nicoló, Giustardi, Cavallin, Straface, & Trevisanuto (2014).	To compare body image in obese and normal-weight breastfeeding mothers.	Prospective case-control study	25 obese and 25 normal-weight pregnant matched controls . 3-4 days postpartum. Italy.  n= 50	Breastfeeding behaviour – exclusive breastfeeding, complementary breastfeeding and exclusive formula feeding.	The Body Uneasiness Test (BUT; (Cuzzolaro, Vetrone, Marano, & Garfinkel, 2006). Concurrent measure 3-4 days postpartum.	T1 = 3-4 days after delivery T2 = 3-6 months postpartum	<ul style="list-style-type: none"> <li>Obese mothers reported significantly higher scores on all BUT-A subscales.</li> <li>Breastfeeding rate at discharge were similar in the two groups but obese mothers were more likely to maintain full breastfeeding at 6 months (<math>p&lt;.04</math>).</li> <li>Authors suggest that obese mothers may be delaying weaning their offspring in the attempt to prevent obesity in their children.</li> </ul>
Zimmerman, Rodgers, O'Flynn, & Bourdeau (2019).	To examine how mothers' concerns over their own and their infants' weight, as well as disordered eating, were associated with exclusive breastfeeding at 6 months.	Cross-sectional online survey	Convenience sample of women who had given birth in the past 6 months. USA  n= 206	Current exclusive breastfeeding status. Breastfeeding Self-Efficacy Scale-Short Form (Dennis, 2003).	Eating Disorder Inventory (EDI -2; Garner, 1991) – Body Dissatisfaction subscale. Concurrent measure at 6 months postpartum.	None	<ul style="list-style-type: none"> <li>Women not exclusively breastfeeding at 6 months had significantly higher body dissatisfaction (<math>p=.003</math>).</li> <li>A direct negative relationship was found between pre-pregnancy BMI and exclusive breastfeeding at 6 months (<math>p&lt;.001</math>).</li> <li>A significant indirect negative relationship was found between pre-pregnancy BMI and exclusive breastfeeding at six months via (a) body dissatisfaction (<math>\beta = -.03</math>, <math>SE = .013</math>, 95% CI= -.06, -.01).</li> </ul>

The mean maternal age in the 14 studies reporting participant demographics ranged from 24.91 to 33.15 (SD= 1.52 – 6.2; Brown et al., 2015; de Jager et al., 2014; Foster et al., 1996; Gjerdingen et al., 2009; Hauff & Demerath, 2012; Johnson-Young, 2019; Mancini, 2017; Rodgers et al., 2018; Sperry, 2011; Swanson et al., 2017; Toolsie, 2000; Welsh, 2009; Zanardo et al., 2014; Zimmerman et al., 2019). Of the five remaining studies, one stated maternal age ranged from 22 to 44 years (median = 31.0, de Jager et al., 2015), one recorded a median maternal age of 31.0 years for those breastfeeding and 29.0 years for those bottle-feeding (Walker & Freeland-Graves, 1998), another reported that 84% of the sample were aged between 20 and 24 years (Barnes et al., 1997) and one study did not report maternal age data (Hughes, 1984). Maternal age data was not available for the study using the Norwegian MoBa sample (Han & Brewis, 2018) although the wider MoBa study aimed to recruit every woman who gave birth in Norway over the recruitment period, with no exclusion criteria (Magnus et al., 2006).

### **Participant Attrition**

The number of data collection points in the studies ranged from one, in cross-sectional designs, to five (Brown et al., 2015). These data collection points, and sample sizes at each, can be seen in Table 1. Eight studies did not provide information about participant attrition rates (Brown et al., 2015; de Jager et al., 2014; Han & Brewis, 2018; Hughes, 1984; Rodgers et al., 2018; Sperry, 2011; Toolsie, 2000; Zimmerman et al., 2019).

Attrition rates varied with study design and method of reporting, ranging from 69.7% in a longitudinal study that reported numbers of eligible women and final data at two time points (0-1 and 9 months, Gjerdingen et al., 2009) to just 9.3% attrition in another

longitudinal study that reported only figures from recruitment onwards (Hauff & Demerath, 2012). This study was also the only one to report analyses around how the women who dropped out/did not consent to participate differed from the final sample to allow them to comment on whether results were representative of the general population.

### **Breastfeeding Measures**

All studies used questionnaires concerning breastfeeding, some completed by the participants and others by the researcher in an interview format. Studies primarily selected participants blind of breastfeeding intention or behaviour, but four studies included breastfeeding measures in their inclusion criteria. One included intention to breastfeed (Hughes, 1984), one included the first feed being a breastfeed (Swanson et al., 2017), another included current breastfeeding (Rodgers et al., 2018) and one study specifically recruited 100 bottle-feeding and 100 breastfeeding mothers (Toolsie, 2000). Table 1 shows which measure of breastfeeding each study used.

### **Narrative Synthesis of Studies**

**Study quality.** The included studies examined body image using 13 different quantitative measures (see Table 1 for details of measures used in each study). Ten of the measures used were previously published and validated questionnaires. Of the three studies that did not use validated measures of body image, one used composites of body image items from other questionnaires (Hauff & Demerath, 2012) and the remaining two used questionnaire and interview items developed specifically for their studies (Brown et al., 2015; Han & Brewis, 2018).

Two studies used different, modified versions of the Body Shape Questionnaire (Cooper, Taylor, Cooper, & Fairbum, 1987), one an 8-item alternate form (Gjerdingen et al., 2009) and one a 10-item shortened form (Welsh, 2009). Four studies used relevant subscales of eating disorder measures; Eating Disorder Examination questionnaire, shape concern and weight concern subscales (Barnes et al., 1997; Foster et al., 1996) and Eating Disorder Inventory 2, body dissatisfaction subscale (Rodgers et al., 2018; Zimmerman et al., 2019). Three studies used measures of pregnancy body image (Barnes et al., 1997; Brown et al., 2015; Foster et al., 1996), ten studies used measures of postpartum body image (Gjerdingen et al., 2009; Mancini, 2017; Rodgers et al., 2018; Sperry, 2011; Swanson et al., 2017; Toolsie, 2000; Walker & Freeland-Graves, 1998; Welsh, 2009; Zanardo et al., 2014; Zimmerman et al., 2019), two studies used pregnancy and postpartum measures (de Jager et al., 2015; Hughes, 1984), one used both a retrospective pre-pregnancy and current pregnancy measure (Han & Brewis, 2018), one used both a retrospective pre-pregnancy and pregnancy measure of body image (Johnson-Young, 2019), one used a retrospective postpartum measure of body image (de Jager et al., 2014) and one used retrospective pre-pregnancy, pregnancy and postpartum measures of body image (Hauff & Demerath, 2012). Whilst 10 of these body image measures have been validated in general population samples, none are known to have been validated in samples of pregnant women or with those in the early postpartum period (Fuller-Tyszkiewicz, Skouteris, Watson, & Hill, 2012) meaning that it may be difficult to generalise the results of the studies included in this review.

Four studies in this review used retrospective measures of body image (de Jager et al., 2014; Han & Brewis, 2018; Hauff & Demerath, 2012; Johnson-Young, 2019) and three used retrospective measures of breastfeeding intention, meaning that recall bias may have affected the quality of these studies. It is important to note that Han & Brewis (2018), the study with

the largest sample size by far ( $n=55,522$ ), reported findings in opposite directions when using retrospective pre-pregnancy versus concurrent pregnancy measures of weight concern. Although, in this study, pregnancy weight concern was specifically about weight gain attributable to pregnancy rather than more global/general body image dissatisfaction. Retrospective data can be subject to recall bias and response shift recall error (Blome, & Augustin, 2015). Response shift is a term most often used in Quality of Life (QoL) studies and describes the phenomena whereby the evaluation of a construct can change as a result of changes in personal values, or a change in perceived definition of the construct. As the current study has shown that body image can be defined in different ways (e.g. appearance evaluation, shape, and weight concern, feeling fat, strength and fitness), motherhood may act as a catalyst for body image response shift. That is, appearance evaluation may have been prioritised pre-pregnancy but becoming a mother has meant that other definitions of body image are prioritised, such as strength or body functionality (Watson et al., 2015). Asking for a retrospective report from a time predating a response shift may not provide reliable information. Retrospective exclusive breastfeeding intention is not as problematic as this is generally a binary response. The data show that body image fluctuates throughout pregnancy and the postpartum period, using a single measure, retrospective or otherwise, may not accurately represent the period for which it claims. There were, however, eight longitudinal studies with multiple time points included in the current review (Brown et al., 2015; de Jager et al., 2015; Gjerdingen et al., 2009; Han & Brewis, 2018; Hauff & Demerath, 2012; Hughes, 1984; Swanson et al., 2017; Zanardo et al., 2014).



Table 2

*CASP quality appraisal summary, adapted from CASP Cohort Studies Checklist*

	<b>Q1. Did the study address a clearly focussed issue?</b>	<b>Q2. Were the subjects recruited in an acceptable way?</b>	<b>Q3. Was the outcome accurately measured to minimise bias?</b>	<b>Q4. Have the authors identified all important confounding factors?</b>	<b>Q4b. Have they taken account of the confounding factors in the design and/or analysis?</b>	<b>Q6. Do you believe the results?</b>	<b>Q7. Can the results be applied to the local population?</b>
Barnes, Stein, Smith, & Pollock (1997).	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brown, Rance, & Warren (2015).	Yes	Yes	Can't Tell	Yes	Yes	Can't Tell	Yes
de Jager, Broadbent, Fuller-Tyszkiewicz, & Skouteris (2014).	Yes	Yes	Yes	Yes	Yes	Can't Tell	Yes
de Jager, Broadbent, Fuller-Tyszkiewicz, Nagle, McPhie, & Skouteris (2015).	Yes	Yes	Yes	Yes	No	No	Can't Tell
Foster, Slade, & Wilson (1996).	Yes	Can't Tell	Can't Tell	No	No	No	Yes
Gjerdengen, Fontaine, Crow, McGovern, Center, & Miner (2009).	Yes	Can't Tell	Yes	Yes	Yes	Can't Tell	Can't Tell
Han, & Brewis (2018).	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hauff & Demerath (2012).	Yes	Yes	Can't Tell	Yes	Yes	Can't Tell	Yes
Hughes (1984).	Yes	Can't Tell	Yes	No	No	No	No
Johnson-Young (2019)	Yes	Can't Tell	Yes	Yes	Yes	No	Yes

	<b>Did the study address a clearly focussed issue?</b>	<b>Were the subjects recruited in an acceptable way?</b>	<b>Was the outcome accurately measured to minimise bias?</b>	<b>Have the authors identified all important confounding factors?</b>	<b>Have they taken account of the confounding factors in the design and/or analysis?</b>	<b>Do you believe the results?</b>	<b>Can the results be applied to the local population?</b>
Mancini (2017).	Yes	Can't Tell	Yes	Yes	Can't Tell	Can't Tell	Can't Tell
Rodgers, O'Flynn, Bourdeau, & Zimmerman (2018).	Yes	Yes	Yes	Yes	No	Can't Tell	Can't Tell
Sperry (2011).	Yes	Can't	Yes	Yes	Can't Tell	Can't Tell	No
Swanson, Keely, & Denison (2017).	Yes	Yes	Yes	Yes	Can't Tell	Can't Tell	Yes
Toolsie, (2000).	Yes	Yes	Can't Tell	Yes	No	Can't Tell	No
Walker, & Freeland-Graves (1998).	Yes	Can't Tell	Yes	Yes	No	Can't Tell	Can't Tell
Welsh (2009).	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zanardo, Gambina, Nicoló, Giustardi, Cavallin, Straface, & Trevisanuto (2014).	Yes	Yes	Yes	Yes	Yes	Can't Tell	Yes
Zimmerman, Rodgers, O'Flynn, & Bourdeau (2019).	Yes	Yes	Yes	Yes	Can't Tell	Yes	Yes

**Studies' findings.** Of the 19 studies, 13 found a significant association between breastfeeding initiation, duration, or behaviour, and measures of body image. Of the six remaining studies, four found no significant association and two found an indirect relationship between breastfeeding and body image. The results of these were synthesised by feeding outcome (breastfeeding intention, duration, and behaviour/status) and the directions of associations or null findings are described below.

***Body image and breastfeeding intention.*** Of the five studies that examined the relationship between body image and breastfeeding intention, four found a significant positive association between maternal body satisfaction and breastfeeding intention and one found a negative association between the two variables. One study used both a retrospective pre-pregnancy and a current pregnancy measure of body satisfaction (Johnson-Young, 2019), three studies used a measure of body satisfaction during pregnancy (Barnes et al., 1997; Brown et al., 2015; Foster et al., 1996) and one study measured postpartum body satisfaction (Rodgers et al., 2018). Mothers reporting higher body image concerns during pregnancy were found to intend to breastfeed for a shorter duration or not at all ( $p=.007$ ; Brown et al., 2015) and women intending to bottle feed reported higher levels of body dissatisfaction ( $p=.004$ ; Foster et al., 1996). The relative odds of breastfeeding intention were 1.25 times higher (OR 1.25, 95%CI: 1.09, 1.42) for feeding during the first week postpartum and 1.26 times higher (OR 1.26, 95%CI: 1.13, 1.42) for feeding up to four months for mothers with no body shape concerns compared to those with discernible concerns (Barnes et al., 1997). Using a postpartum measure of body satisfaction in the testing of a biopsychosocial model of body image, Rodgers and colleagues (2018) found that greater self-objectification (the propensity to view one's body from an outside 'objectifying' viewpoint and a significant predictor of body dissatisfaction) was a predictor of greater barriers to breastfeeding ( $p<.01$ ). The authors

hypothesised that this was due to self-objectification being associated with greater concerns about the impact of breastfeeding on physical appearance (e.g., “breastfeeding will make my breasts sag”).

In contrast to these findings, a study by scholar Johnson-Young (2019) did not find a relationship between pregnancy body satisfaction and breastfeeding intention, and the association between retrospective pre-pregnancy body satisfaction and intention to breastfeed for 3 and 6 months was significant but in the opposite direction to the studies described above ( $p < .10$ , Johnson-Young, 2019). The author hypothesised that this negative association could be due to women with higher body satisfaction being less concerned with the weight loss benefits of breastfeeding or the external pressure to breastfeed, via greater overall confidence, than those with lower body satisfaction (Johnson-Young, 2019). However, this association was a weak bivariate correlation ( $r = -.16$  at 3 months;  $r = -.11$  at 6 months) and significant only at  $p < .10$  level so one could not confidently believe the results during the quality appraisal process.

Studies that measured breastfeeding intention, but did not include it in analyses with body image measures include: Hauff and Demerath (2012), who reported a positive relationship between intended breastfeeding duration and both exclusive and any breastfeeding ( $p = .0004$  and  $p < .0001$ ); Hughes (1984), who selected participants on the basis of breastfeeding intention; and two other studies that did not find an association between exclusive breastfeeding intention and duration (de Jager et al., 2014; de Jager et al., 2015).

***Body image and breastfeeding initiation.*** Few studies examined the relationship between body image and breastfeeding initiation. The most common outcome of interest was

duration of breastfeeding with breastfeeding initiation (or breastfeeding status at birth) being used as selection criteria for inclusion in a number of cross sectional studies, see section on body image and breastfeeding status. Of the two high quality studies that did explore the relationship between body image and breastfeeding initiation, significant results were found in opposite directions. Brown et al. (2015) found significant differences in infant feeding method at birth with respect to both pregnancy body image ( $p = .008$ ) and prospective postnatal body image ( $p = .000$ ), with mothers who formula fed at birth having higher body image concerns. However, in a large sample of overweight/obese and non-overweight women ( $n = 55,522$ ), Han and Brewis (2018) found higher pre-pregnancy body concerns to be significantly positively associated with breastfeeding initiation (overweight/obese,  $p < .05$ ; healthy weight,  $p < .05$ ). The majority of participants in the study by Brown et al. (2015) were of a normal BMI, indeed BMI was controlled for using a MANCOVA in their analyses. It may be that the association between body image and breastfeeding operates differently in overweight/obese women. The multiple functions/motivations for breastfeeding in this group requires further study.

***Body image and breastfeeding duration.*** Five studies found significant associations between body image and breastfeeding measures beyond intention and initiation and one study did not find an association. In a study that followed women from pregnancy to six months postpartum (with intention data described above), any breastfeeding at two, six, twelve or twenty-six weeks was found to be significantly associated with lower body image concerns reported in both pregnancy ( $p = .008$ ) and postpartum ( $p = .000$ , Brown et al., 2015). A similar association was found using retrospective pre-pregnancy body image measures, where women reporting greater body concerns were found to have a shorter duration of exclusive ( $p = .013$ ) or any ( $p = .0005$ ) breastfeeding than those with lower body concerns (Hauff &

Demerath, 2012). Likewise, in a group of women who had initiated breastfeeding at birth, higher postpartum body satisfaction was found to correlate with breastfeeding maintenance at 6-8 weeks postpartum ( $p \leq .001$ , Swanson et al., 2017).

In a large sample of overweight/obese and non-overweight women ( $n = 55,522$ ), Han and Brewis (2018) found that body concerns due to pregnancy predicted earlier weaning, regardless of BMI (overweight/obese,  $p < .05$ ; healthy weight,  $p < .05$ ). However, in overweight women only, pre-pregnancy body concerns significantly mediated breastfeeding duration (.02 months increase per  $1\text{kg/m}^2$ ;  $p < .05$ ). The authors suggested that the women in their sample with greater weight concerns might be breastfeeding for longer to lose weight. It is important to note that, in this study, the measure of body image was specifically around weight (pre-pregnancy weight concern or pregnancy weight gain concern) rather than other aspects of body image related to pregnancy or specific body areas. Another study comparing obese and healthy weight women in a much smaller sample ( $n = 50$ ), found that obese mothers reported significantly higher postpartum body image concerns ( $p < .0001$ ) but maintained full breastfeeding for longer compared to normal-weight mothers ( $p < 0.04$ , Zanardo et al., 2014). The authors explained that this could reflect obese mothers breastfeeding longer to prevent their children from also becoming obese in the future (Zanardo et al., 2014). It is plausible to suggest that another reason for this finding could be that obese mothers could be using breastfeeding as a weight loss strategy, as suggested by Han and Brewis (2018). Whilst data from Zanardo and colleagues suggests that there is a relationship between BMI and body image concerns, this was only examined in a small sample of 25 obese women, compared to the 17,496 overweight/obese women in the study by Han and Brewis (2018). It may be that weight concerns and body image dissatisfaction are measures of very different things, particularly in women with a high BMI, and operate independently of each other and interact

differently with other factors that affect infant feeding decisions such as confidence feeding in public, social support and concerns over milk supply.

Finally, de Jager et al. (2015) found no relationship between body image (measured during pregnancy and at two and six months postpartum) and exclusive breastfeeding duration. They did, however, find indirect associations at six months; body image was found to be significantly correlated with psychological adjustment, which was a predictor of exclusive breastfeeding duration. This study was underpowered and included both primigravida and multigravida mothers in their analyses.

***Body image and breastfeeding status.*** Nine studies examined the association between body image and breastfeeding status. Four of these studies found a significant positive association between the two variables and five did not find a significant direct association. Women who were currently breastfeeding were found to have significantly higher postpartum body satisfaction ( $p < .01$ ; Welsh, 2009), higher postpartum body image ( $p = .002$ ; Toolsie, 2000) and lower levels of postpartum body dissatisfaction at six months ( $p < .01$ ; Zimmerman et al., 2019) and nine months ( $p = .009$ ; Gjerdingen et al., 2009) compared to women who were bottle-feeding. Specifically, breastfeeding mothers were more comfortable with their body image than bottle-feeding mothers who reported feeling more ‘neutral’ about theirs (Toolsie, 2000).

In the only study to include mothers of children beyond the age of 9 months (mean child age = 19.62 months), Sperry (2011) found no significant relationship between retrospectively reported breastfeeding status (e.g., “Did you breastfeed, or are you currently breastfeeding, your last child?”) and postpartum maternal body image. This study was

underpowered due to a small sample size, and confounding variables (e.g. maternal income and eating concerns) were not controlled for due to the correlational analyses used. Mancini (2017) supported this finding using the same subscale of the MBSRQ (Cash, 1990) to measure postpartum body image, finding no significant difference in body image scores between mothers who were either exclusively breast or bottle-feeding. Whilst this study was sufficiently powered, the overall sample was small and self-selecting (N = 66) and body image was measured at 2-6 months postpartum so it is hard to draw conclusions about how this impacted on infant feeding decision or if body image had been impacted by pregnancy/birth/feeding decision. In a study by Hughes (1984), mothers who did not meet their breastfeeding goals at 4 weeks postpartum reported slightly greater body satisfaction than women who did meet their breastfeeding goals, but this trend did not reach statistical significance. This study however, had a very small sample with only 11 women in the group who did not meet their breastfeeding goals so conclusions should be interpreted with caution. Similarly, no significant difference was found between postpartum body image dissatisfaction score across groups of breast and bottle-feeding mothers in a study by Walker and Freeland-Graves (1998). However, this study did find differences in body image dissatisfaction scores within the feeding groups. Mothers in the bottle-feeding group with higher postpartum weight gain reported greater body image dissatisfaction than those with lower postpartum weight gains; this relationship was not found in breastfeeding mothers with high/low postpartum weight gains. Lastly, de Jager et al. (2014) did not find an association between body image and comfort breastfeeding in public but claimed evidence of an indirect relationship via body image and maternal attitude towards pregnancy which they argued were likely to affect breastfeeding outcomes.

***Studies examining BMI.*** Whilst only three studies were designed to compare obese and normal-weight mothers (Han & Brewis, 2018; Swanson et al., 2017; Zanardo et al.,



2014), several other studies included Body Mass Index (BMI) in their analyses with mixed results. Where breastfeeding status was measured, three studies found that breastfeeding women had lower BMI than women who were not breastfeeding ( $p < .05$ , Sperry, 2011;  $p < .05$ , Welsh, 2008;  $p < .001$ , Zimmerman et al., 2019) and two studies did not find an association between BMI and breastfeeding status (Foster et al., 1996; Walker & Freeland-Graves, 1998). In terms of breastfeeding duration, three studies found that women with a lower BMI breastfed for longer ( $p < .05$ , Han & Brewis, 2018;  $p = .019$ , Hauff & Demerath, 2012;  $p = .03$ , Swanson et al., 2017), one study contradicted this in finding that obese mothers were more likely to maintain breastfeeding for longer ( $p < .04$ , Zanardo et al., 2014) and another study found pre-pregnancy and postnatal BMI to be unrelated to both intended and actual breastfeeding duration (Brown et al., 2015).

## **Discussion**

### **Summary of Evidence**

This review identified mixed findings concerning the relationship between body image and breastfeeding intention, behaviour and duration. This contradicts the work of Morley-Hewitt and Owen (2020) and adds credence to the commentary by Bigman and colleagues (2019) which argued that the relationship between body image and breastfeeding intentions and outcomes was more complicated than initially described. The previous review concluded that seven of the nine studies found a direct positive relationship between maternal body image and breastfeeding intention and/or behaviour, and the remaining two found indirect relationships between the two variables (Morley-Hewitt & Owen, 2020). Whilst only eight of the nine studies from the original review were included in the current review due to the exclusion of studies from developing countries, the addition of eleven other studies that were omitted or published subsequent to Morley-Hewitt and Owen's (2020) searches, add important information that contradicts the clear relationship identified in the previous review.

The current review found a more positive body image to be associated with a positive breastfeeding intention in pregnancy (Barnes et al., 1997; Brown et al., 2015; Foster et al., 1996; Rodgers et al., 2018). Women who report concerns over their pre-pregnancy weight rather than dissatisfaction with their body image, however, are also more likely to report an intention to breastfeed (Han & Brewis, 2018). Where retrospective pre-pregnancy body satisfaction in normal-weight women was found to be negatively associated with breastfeeding intention, it was hypothesised that those with better confidence and body image may be less susceptible to external pressure to breastfeed (Johnson-Young, 2019). Indeed,

embarrassment and discomfort breastfeeding in public were reasons cited for breastfeeding cessation suggesting that confidence may play a part. Attitudes towards breastfeeding, maternal age and education, breastfeeding self-efficacy and self-objectification, amongst others, were all found to be associated with breastfeeding measures and offer ideas for areas of intervention. These variables should be controlled for in future research and could be incorporated into interventions to support breastfeeding.

As shown previously, women with a more positive body image are more likely to initiate breastfeeding and report current breastfeeding in cross sectional studies (Gjerdingen et al., 2009; Toolsie, 2000; Welsh, 2009; Zimmerman et al., 2019). There were, however, six studies that did not find associations between body image measures and breastfeeding outcomes (de Jager et al., 2014; de Jager et al., 2015; Hughes, 1984; Mancini, 2017; Sperry, 2011; Walker & Freeland-Graves, 1998), although two claimed to have found evidence for indirect relationships via other variables (pregnancy attitude and postpartum attitude, de Jager et al., 2014; salience of weight and shape, de Jager et al., 2015). Two of these six studies were underpowered (de Jager et al., 2015; Sperry, 2011) two had no information about a priori power analyses (Hughes, 1984; Walker & Freeland-Graves, 1998) and two had sample sizes that met or exceeded the targets from their power calculations (de Jager et al., 2014; Mancini, 2017), which may provide an explanation for these null findings. This does also mean that only two of the studies finding significant associations reported having adequate power.

Women reporting having a more positive body image within the reviewed studies were also found to report an increased breastfeeding duration (Brown et al., 2015; Hauff & Demerath, 2012; Swanson et al., 2017). Where women reported concerns over their pregnancy weight gain, breastfeeding was found to be curtailed sooner (Han & Brewis, 2018)

a result which could perhaps be confounded by body confidence being affected by pregnancy related changes and a reluctance to breastfeeding in public.

The relationship between breastfeeding and BMI appears to be more complicated and it is suggested that this is mediated by body image (Han & Brewis, 2018). Overall evidence from the reviewed papers points to breastfeeding women having a lower BMI than those who report not breastfeeding. Two studies that did not find an association between BMI and breastfeeding status were of lower quality, using a retrospective self-report of pre-pregnancy BMI (Walker & Freeland-Graves, 1998) and having a small sample ( $n=38$ ) split into two feeding groups with no indication of how many women were in each group (Foster et al., 1996). There was some evidence to suggest that BMI is unrelated to breastfeeding duration (Brown et al., 2015) although the sample in this study was small and self-selecting. Evidence from several other studies that found that women with a lower BMI breastfed for longer, including a high quality prospective study with three time points, high statistical power due to having the biggest sample by far and a contemporaneous measure of BMI (Han & Brewis, 2018). However, there were differences within the sample of obese women, namely that those with greater pre-pregnancy weight concerns breastfed for longer. Zanardo and colleagues (2013) also found that obese women in their sample were more likely to breastfeed to six months when compared to women in the normal weight group, although there were only 25 women in each feeding group which may be insufficient to minimise the play of chance (Zanardo et al., 2013). It can be argued that the results appear to differ as a result of measures of BMI, weight concern and body dissatisfaction that are often assumed to be associated but are not necessarily so. To be categorised as obese requires a BMI  $>30$  so there could potentially be huge variation within the obese group (whereas healthy weight requires a BMI of 20-25). Someone with a BMI of 30 may not necessarily view themselves as someone with

a weight that warrants concern, and they may or may not experience a degree of body image dissatisfaction. In the study by Han and Brewis (2018), it was the women in the obese group who had concerns about their weight prior to pregnancy that breastfed for longer. This could be attributed to wanting the weight loss benefits of breastfeeding or to wanting to protect their children from obesity as suggested by Zanardo and colleagues (2013) although these are simply hypothesis for future studies to examine.

Unsurprisingly, timing of body image measurement seems to be an important factor to consider. Han and Brewis (2018) found associations in opposite directions when using retrospective pre-pregnancy versus contemporaneous pregnancy weight concern measures in overweight and non-overweight groups. It is important to note that the body image measure used in this study related only to concern about weight and pregnancy weight gain, rather than other aspects of body satisfaction and body concerns specific to pregnancy. It could be argued that questions relating to concerns over pregnancy weight gain and questions about body area satisfaction whilst pregnant are asking about two very different things under the umbrella of 'body image'. Most studies measuring postpartum body image did so 4-6 months after birth, while two studies measured this at 4-8 weeks postpartum. Body satisfaction immediately following birth was found to be low for both obese and normal-weight weight mothers and this reduced further by 8 weeks postpartum (Swanson et al., 2017). However, in a sample using the same Appearance Evaluation subscale of the MBSRQ (Cash, 1990) at 2-6 months postpartum but not stratified by BMI, women reported higher mean scores in both the breast and bottle-feeding groups (Mancini, 2017). This difference could be due to the studies being conducted in different countries (USA, Mancini 2017; UK, Swanson et al., 2017) or the difference in sample education level (degree level education or above: 98.5%, Mancini, 2017; 72.8%, Swanson et al., 2017). Mancini (2017) did have a smaller sample size (n=66)

compared to Swanson et al (2017; n=116) but both studies were sufficiently powered to detect effects. Variable body image level might be expected given that, in the very early postpartum period, women are recovering from childbirth, which may have involved medical intervention or major surgery. Repeated measurement of postpartum body image to counter the effects of early negative self-appraisal may be a more accurate way of determining a true value of body image in the postpartum period. It may also prove prudent to control for medical interventions during birth and pre and post-pregnancy BMI when measuring postpartum body image.

The questionnaires used to measure body image varied significantly between studies and none had been validated in women during pregnancy or the perinatal period. The Body Attitudes Questionnaire (BAQ; Ben-Tovim & Walker, 1991), for example, is one of the most widely used measures of body image but has been found to have poorer model fit in pregnant women (Fuller-Tyzskiewicz et al., 2012). Two included studies used this measure (de Jager et al., 2014; de Jager et al., 2015), which may go some way to explain their failure to find a direct relationship between body image and breastfeeding. Eight studies included in the current review measured body image during pregnancy (Barnes et al., 1997; Brown et al., 2015; de Jager et al., 2015; Foster et al., 1996; Han & Brewis, 2018; Hauff & Demerath, 2012; Hughes, 1984; Johnson-Young, 2019) and only one study measured postpartum body image beyond 9 months postpartum (Sperry, 2011), when research has shown that women up to 12 months postpartum report feeling fatter, less strong, and less fit compared to before pregnancy (Rallis et al., 2007). Pregnancy measures of body image appear to be associated with positive breastfeeding outcomes in the current review. Three of the studies that used a measure of pregnancy body image reported null or indirect findings (de Jager et al., 2015; Hughes, 1984; Johnson-Young, 2019), whilst the remaining five found a positive relationship between body image and breastfeeding measures (Barnes et al., 1997; Brown et al., 2015;

Foster et al., 1996, Han & Brewis, 2018; Hauff & Demerath, 2012). The studies reporting null findings were underpowered (de Jager et al., 2015) or were of poor quality with a very small sample size or did not report power analyses (Hughes, 1984; Johnson-Young, 2019), which may account for their inability to detect an effect. Pregnancy body satisfaction did initially predict breastfeeding at 3 months in the Johnson-Young (2019) sample, but this effect was no longer present once theory of planned behaviour (TPB) variables were added into the regression analysis and was not observed at all in analyses predicting breastfeeding to 6 or 12 months (Johnson & Young, 2019). The findings from studies reporting postpartum body image measures show less agreement. Four reported null findings or indirect effects (de Jager et al., 2014; Mancini, 2017; Sperry, 2011; Walker & Freeland-Graves, 1998), six studies found a positive relationship between body image and breastfeeding measure (Gjerdingen et al., 2009; Rodgers et al., 2018; Swanson et al., 2017; Toolsie, 2000; Welsh, 2009; Zimmerman et al., 2019), and one study found a positive relationship between body image concerns and breastfeeding duration (Zanardo et al., 2014).

### **Alternative Explanations for the Findings.**

For many of the studies included in this review, body image was not the only variable included in analyses with breastfeeding measures. Other variables found to be significantly associated with breastfeeding intention, duration or behaviour were: older maternal age (Barnes et al., 1997), higher maternal education level (Barnes et al., 1997; Swanson et al., 2017), controlling and less child-centred parenting (Barnes et al., 1997), breastfeeding self-efficacy (de Jager et al., 2014; de Jager et al., 2015; Zimmerman et al., 2019), comfort breastfeeding in public (de Jager et al., 2014), maternal attitude to pregnancy (de Jager et al., 2014), psychological adjustment (de Jager et al., 2014; de Jager et al., 2015), higher levels of

maternal foetal attachment (Foster et al., 1996), attitudes towards breastfeeding (Johnson-Young, 2019; Mancini, 2017), breastfeeding control (Johnson-Young, 2019), more positive eating attitudes (Mancini, 2017), self-objectification (Rodgers et al., 2018; Welsh, 2009), eating concern and higher income (Sperry, 2011), mothers' unresolved issues concerning their breasts, prior exposure to breastfeeding and stable love relationships with partners who support breastfeeding (Toolsie, 2000), disordered eating and higher child weight concerns (Zimmerman et al., 2019). Future studies examining the relationship between breastfeeding and body image should aim to measure and control for these variables.

**Reasons for breastfeeding cessation.** Reasons cited by mothers in the studies for discontinued breastfeeding included perceived impact on breast shape (Brown et al., 2015), discomfort breastfeeding in public (Brown et al., 2015; Hauff & Demerath, 2012), returning to work/education and partners/mother/family requesting them to stop (Toolsie, 2000). These reasons are important to consider as they could inform intervention, antenatal feeding discussion, and public/employment service provision to prevent unnecessary and unwelcome early breastfeeding cessation.

## **Limitations**

A primary limitation of this review is that the searches were only conducted by the author. Ideally, these would have been checked by a second researcher to reduce bias and ensure that all articles were screened correctly. The review would also have benefitted from having a second researcher complete a quality appraisal of included studies using the CASP checklists to measure interrater reliability for each criterion.



The low sensitivity of the search is a limitation of the study as it meant that a very high volume of articles was returned, even after accounting for duplicates. Due to using search terms such as ‘lactation’, as recommended in the commentary paper (Bigman et al., 2018), the search returned more than 7000 animal studies. A high number of articles was screened out by title as it was possible to identify and reject these animal studies (7,271 studies), studies conducted in developing countries (2,057 studies), those involving samples with current eating disorders (102 studies) and 124 articles from a drugs and lactation database (LactMed). This was in addition to the studies that were deemed unsuitable by title as they did not directly refer to breastfeeding and/or a component of body image.

The data within this review is limited by studies not accounting for mode of delivery as a confounding variable in their analyses, particularly where samples include overweight/obese women. Research indicates that obese women are at increased odds of birth complications (during and post-delivery) and instrumental delivery (Heslehurst et al., 2008) and that women who deliver by caesarean show a lower rate of exclusive/any breastfeeding and a shorter breastfeeding duration compared to women who deliver vaginally (Chen et al., 2018).

A further limitation of this systematic review is that searches returned several qualitative studies examining the relationship between body image and breastfeeding, but these were not included in the synthesis. Priority was given to improving the original review by Morley-Hewitt & Owen (2020) and, as searches returned 19 relevant quantitative studies, inclusion of the additional qualitative studies for a mixed methods review proved unfeasible at this time. Finally, whilst this review did include dissertations and doctoral theses, only

including published studies may have contributed to a ‘file drawer effect’ of a bias towards significant findings.

## **Future Studies**

Future studies should look to use standardised measures of body image that are validated for use in pregnancy and the first postpartum year given the peak of body dissatisfaction reported at this time and the unique body changes experienced following birth. Childbearing specific measures of mood have been developed and have been shown to be more effective in predicting perinatal outcomes than general mood measures (Fallon, Halford, Bennett, & Harrold, 2018). This could be the case for childbearing body image. One study in the current review acknowledged these issues and developed a measure of body image specific to pregnancy, including items about concerns regarding stretch marks and weight gain, for use in their study (Brown et al., 2015). The Body Image in Pregnancy Scale (BIPS) has recently been developed for and validated specifically in pregnancy (Watson, Fuller-Tyszkiewicz, Broadbent, & Skouteris, 2017), yet further work is needed to examine this in analyses with breastfeeding intention, duration and behaviour. Using such a measure would also ensure that pregnant women are being asked relevant questions about their changing body and the impact of this on their thoughts, feelings and behaviours. Studies in this review used 13 different measures of body image. Whilst 10 of these had been validated in other studies, concerns have been raised about the validity of using measures of body image in pregnancy when women are undergoing extreme changes in body shape and size over relatively short periods of time, especially as these measures tend not to have been validated in such samples (Fuller-Tyszkiewicz, Skouteris, Watson, & Hill, 2012). There is evidence to suggest that being a mother is protective against body dissatisfaction, affording women a

renewed appreciation of their bodies (Fox & Neiterman, 2015). Other studies suggest that body image is of variable importance to mothers compared to other narratives regarding maternal role (Jordan, Capdevila, & Johnson, 2005). Positive changes to body image should be considered alongside quantitative items to examine this and the fluid importance of body image in the perinatal period.

There is much to be learned from exploring the reasons why women discontinue breastfeeding as to how women can be better supported by services in pregnancy and with postpartum feeding challenges. Only four studies in this review reported reasons for breastfeeding cessation (Brown et al., 2015; Hauff & Demerath, 2012; Johnson-Young, 2019; Rodgers et al., Toolsie, 2000) and one reported reasons why women choose to breastfeed (Toolsie, 2000). Likewise, it is important to know why women continue to breastfeed when obstacles can mean ‘endurance’ is required (Ayton, Tesch, & Hansen, 2019). Knowing more about this may help with understanding the mechanisms involved in the associations between body image and breastfeeding intentions and behaviours. This would also enable us to bring more clarity to the data around breastfeeding, body image and BMI. Future studies should explore whether anticipated weight loss was a reason for both choosing to breastfeed and breastfeed for longer, alongside items about pre-pregnancy weight concern and body image satisfaction (validated for use in the perinatal period).

## **Clinical Implications**

The evidence suggests that body image does have a relationship to breastfeeding, but this relationship is complex. Clinicians must consider what can be done to normalise breastfeeding and body changes in the perinatal period, what information women encounter

that might be harmful to their perceived body image, and what support can be offered for body image concerns (Coyne et al., 2018; O'Brien, Myles, & Pritchard, 2017; Roth, Homer, & Fenwick, 2012). It is important to learn more about the foundations of body image for women in the perinatal period and whether this is influenced by internal or external sources, or both. Coyne and colleagues (2018) recommended that health professionals should be educated about body image issues in pregnant women to allow for meaningful discussion in a supportive forum. A further recommendation was to educate women on how to become critical viewers of unrealistic images of pregnant women in the media, as being sceptical of unrealistic media representations has been associated with positive body image outcomes in young women (Pope, Corona, & Belgrave, 2014).

Awareness of women's pregnancy body concerns will enable clinicians to place their interventions in the best forum at the most appropriate time to help normalise breastfeeding. Interventions should seek to debunk misinformation about the effects of breastfeeding on breast aesthetics that has been shown to lead to formula-feeding or breastfeeding cessation (Rinker et al., 2008). Normalising breastfeeding may serve to reduce embarrassment and discomfort breastfeeding in public, reasons given for choosing not to breastfeed or stopping breastfeeding earlier than intended.

Services could routinely ask about body image concerns at key points in maternity care to monitor fluctuations from baseline and allow for targeted breastfeeding support to women who are interested in breastfeeding but at risk of not meeting their goals. Interventions that target body image, confidence, and appreciation of the body as functional rather than objectified could potentially be effective. Prior exposure to breastfeeding was found to be positively associated with breastfeeding outcomes as have interventions that included

information about resolving common problems (Kramer et al., 2001), suggesting that women benefit from seeing the realities of breastfeeding. It is important that women are given realistic antenatal information about infant feeding and what body changes to expect so they can be proactive in seeking support rather than reactive when met with unexpected obstacles that do not fit with media images.

## **Conclusions**

This systematic review indicated that a positive body image is associated with positive breastfeeding outcomes in normal weight women. However, research in samples of overweight/obese women suggests that body image significantly mediates the relationship between BMI and breastfeeding and that this can operate differently in women in different BMI groups and when considering body image concerns from pre-pregnancy and as a result of pregnancy. Breastfeeding serves many functions for both mother and baby and further exploration of the importance assigned to each function is needed to understand motivation to continue or truncate breastfeeding in women with different demographics. Body image fluctuates over the perinatal period as bodies change rapidly and women have concerns about different aspects of their bodies, e.g. breast aesthetics, weight gain, stretch marks and breastfeeding in public. This means that interventions targeting body image must take measures of this at multiple points in real-time. Even though there is a measure of body image developed specifically for use in pregnancy (BIPS), this is relatively new, so most studies used different measures of body image, making direct comparison of results more difficult. Many other variables were found to be associated with breastfeeding intention, initiation, and duration, pointing to the need for a multifaceted approach of support for women to meet their feeding goals. A need for realistic antenatal information that explores and normalises perinatal

body changes and breastfeeding obstacles is recommended to enable women to be proactive in their support seeking.

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**Chapter 2: Antenatal feeding information and postnatal feeding experiences: The relationship between the breastfeeding intention-behaviour gap, maternal mental health, and online social comparison<sup>1</sup>**

## **Abstract**

The Baby Friendly Initiative (BFI) has proved successful in facilitating breastfeeding initiation yet more work is needed to support the majority of UK first-time mothers who do not meet their own breastfeeding goals. The bulk of the literature in this area focuses on physical challenges and postnatal breastfeeding support. This study aims to explore the interplay between social media use, social comparison, presence of a breastfeeding intention-behaviour gap (BIBG), and maternal mental health. One hundred and nineteen pregnant primiparous women were recruited through advertising on social media and completed online surveys in pregnancy and at 6-14 weeks postpartum. Whilst 58% of mothers indicated that the BFI feeding discussion had not prepared them as well for the reality of infant feeding as they had expected, this was not associated with the presence of a BIBG. Presence of a BIBG was not associated with postnatal social comparison or indices of postnatal mental health once antenatal mental health was controlled for. Higher social comparison predicted increased levels of postnatal depression and anxiety, after controlling for antenatal symptomatology. Findings also highlighted the importance of antenatal levels of depression and anxiety in predicting mental health outcomes. This study demonstrates a link between social comparison in pregnancy and maternal mental health, emphasizing the importance of supporting women antenatally to improve outcomes in the postnatal period for both mother and baby. It is important to consider ways to support new and expectant mothers by offering targeted and accessible services, and by maintaining an objective presence on the most often accessed forums.

## **KEYWORDS**

Baby Friendly Initiative, breastfeeding, social comparison, social media, infant, maternal, UK

## Introduction

Breastfeeding is widely recognized to offer short and long-term health benefits to both mother and baby (Binns, Lee, & Low, 2016; Sankar et al., 2015; Stuebe, 2009; Victoria, 2000) and current guidelines by the World Health Organisation (WHO, 2015) recommend exclusive breastfeeding up to 6 months. Whilst breastfeeding initiation rates in the UK have risen by a third since 1990, with an estimated 81% of mothers initiating breastfeeding (McAndrew et al., 2012), the latest UK infant feeding survey indicates that exclusive breastfeeding to 6 months is only met by 1% of mothers (McAndrew et al., 2012). This means that the majority of first-time mothers are not meeting their own exclusive breastfeeding goals (Perrine, Scanlon, Li, Odom, & Grummer-Strawn, 2012; Semenic, Loiselle, & Gottlieb, 2008). The incongruity between antenatal breastfeeding intention and postnatal feeding behaviour is known as the breastfeeding intention-behaviour gap.

Research indicates that a BIBG is associated with an increased risk of maternal guilt, dissatisfaction (Komninou, Fallon, Halford, & Harrold, 2017) and postpartum depression (Borra, Iacovou, & Sevilla, 2015; Gregory, Butz, Ghazarian, Gross, & Johnson, 2015). Such emotional experiences in the perinatal period are associated with adverse effects on parenting, feeding behaviours, and infant attachment (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003; Dennis & McQueen, 2009; Dennis & McQueen, 2009; Galbally & Lewis, 2017) which, in turn, can have long term effects on child development and later adult functioning (Moutsiana et al., 2015; Prenoveau et al., 2017). The number of mothers who are physically unable to successfully breastfeed is around 5% (Thulier & Mercer, 2009), suggesting that a BIBG is unlikely to be related to physical limitations. Frequently cited reasons for early breastfeeding cessation include physical discomfort, perceived insufficient

milk supply and perceived infant dissatisfaction or loss of interest in the breast (Ahluwalia, Morrow, & Hsia, 2005; Li, Fein, & Grummer-Strawn, 2008; Odom, Li, Scanlon, Perrine, & Grummer-Strawn, 2013).

The Baby Friendly Initiative (BFI), a worldwide programme aiming to improve breastfeeding rates and care within hospital and community care settings, was introduced in 1991 by the WHO and UNICEF to empower services to protect, promote and support breastfeeding. The Baby Friendly staged accreditation programme outlines a ‘roadmap’ for maternity, neonatal, health visiting, and children’s centre services to best support mothers to breastfeed and build a secure relationship with their infants (UNICEF, 2017). Accreditation involves satisfying criteria of a three-stage programme. Services must implement baby friendly policies and guidelines, ensure breastmilk substitutes are not promoted, train staff to implement the standards, educate parents about the importance of breastfeeding and the parent-infant relationship, and support mothers to initiate and successfully establish breastfeeding. Global research suggests that the BFI has a positive effect on short, medium, and long-term breastfeeding outcomes (Pérez-Escamilla, Martinez, & Segura-Pérez, 2016). However, the UK appears to have a unique feeding landscape with the BFI conferring only transient positive effects, evidenced by increased breastfeeding initiation yet low rates of continued exclusive breastfeeding (Bartington, Griffiths, Tate, & Dezateux, 2006; Fallon, Harrold, & Chisholm, 2019; McAndrew et al., 2012).

Research suggests that breastfeeding intention is a strong predictor of initiation (Lawton, Ashley, Dawson, Waiblinger, & Conner, 2012) and duration (DiGirolamo, Thompson, Martorell, Fein, & Grummer-Strawn, 2005). Breastfeeding intentions and goals are generally established by the third trimester (Rollins et al., 2016) and often in early



pregnancy or before conception (Earle, 2002). In the UK, midwives discuss feeding with expectant mothers at around 28 weeks gestation. However, current guidelines about how the delivery of this information should be balanced with respect to bottle and breastfeeding are unclear (Fallon et al., 2019). The current BFI support has been criticised for its ‘one-size fits all’ format, which can be both impersonal and unhelpful (Fallon et al., 2019). Mothers are neither prepared for the challenges of breastfeeding nor equipped with the necessary information about the practicalities of bottle-feeding (Hoddinott, Craig, Britten, & McInnes, 2012; Komninou et al., 2017; Lakshman, Ogilvie, & Ong, 2009; Trickey & Newburn, 2014). Women report feeling as though breastfeeding information is prioritized over information about formula or mixed feeding (Fallon et al., 2019; Lakshman et al., 2009) and a sense that midwives are not ‘allowed’ to provide formula feeding information (Lagan, Symon, Dalzell, & Whitford, 2014). Mothers who formula feed report feeling unsupported and judged (Appleton et al., 2018; Fallon, Komninou, Bennett, Halford, & Harrold, 2017; Trickey & Newburn, 2014) although those who choose not to breastfeed report less internal and external stigma than those with a BIBG (Bresnahan et al., 2020).

Whilst formula feeding information is reportedly insufficient, BFI breastfeeding information has been described as idealistic and responsible for setting women up to fail (Fallon et al., 2019; Hall, McLelland, Gilmour, & Cant, 2014; Hoddinott et al., 2012). This idealism has contributed to the discourse of breastfeeding as being indicative of “a good” or “moral” mother with formula feeding mothers falling short (Faircloth, 2010; Knaak, 2010; Ryan, Bissell, & Alexander, 2010). Mothers can internalise this binary classification of good/bad mother and many experience guilt, stigma, and defensiveness around their feeding decisions (Fallon et al., 2017). Women want to hear a more realistic and well-balanced account of breastfeeding that details possible feeding challenges, allows them to make a fully

informed feeding decision, and prepares and empowers them for their postnatal experiences (Lakshman et al., 2009; Schmied, Beake, Sheehan, McCourt, & Dykes, 2011). When mothers are faced with unexpected breastfeeding challenges in the postnatal period, universal services in the UK are not always able to provide the support needed to help them overcome obstacles and successfully establish breastfeeding (Hoddinott et al., 2012). It is therefore even more important that antenatal services provide balanced, realistic, and practical information about infant feeding to prepare mothers for postnatal challenges. If mothers do not get the necessary information from health professionals, they will seek it elsewhere and risk receiving insufficient or outdated knowledge, particularly around safe formula preparation and practice (Lakshman et al., 2009). This is an important public health issue given that 99% of UK infants are fed something other than breastmilk in their first 6 months (McAndrew et al., 2012) and that negative emotions associated with feeding challenges can lead to postpartum mental health difficulties (Dunford & Granger, 2017). It is imperative that the BFI provides adequate information regarding feeding options and compassionate, person-centred support for women who find themselves unable to meet their own breastfeeding goals.

### **Social Media and Social Comparison**

Mothers have been found to be avid users of social media (Duggan, Lenhart, Lampe, & Ellison, 2015). Recently the term ‘sharenting’ has been introduced to describe the phenomenon of sharing child-related content on social media sites (Blum-Ross & Livingstone, 2017). Online pages and sites aimed at parents are hugely successful and attract millions of unique visitors and 100s of millions of page views per month (Mumsnet.com, 2020). Never have the intimate parenting views and practices of others been more

anonymously accessible. Breastfeeding is not exempt from sharenting. Celebrities and other breastfeeding allies sharing ‘brelfies’ (breastfeeding selfies) on social media to ‘normalise’ breastfeeding and desexualise the breast is becoming increasingly popular. These often staged, idealistic breastfeeding images may not fit with the experiences of many UK mothers and could engender feelings of comparative inadequacy. Conversely, the sharing of difficult feeding experiences when mothers are unable to breastfeed may fuel the belief that more mothers are physically unable to breastfeed than research suggests. This process by which mothers compare themselves and their experiences to others is referred to as social comparison, “the desire to affiliate with others, the desire for information about others, and explicit self-evaluation against others” (Taylor & Lobel, 1989).

Social comparison and feedback seeking on social media have been associated with symptoms of depression in adolescents, particularly females (Nesi & Prinstein, 2015). Research shows that those with high levels of depression engage in more negative or upward social comparisons than matched controls (Bäzner, Brömer, Hammelstein, & Meyer, 2006). Upward comparison involves comparing the self with ‘superior’ others whereas downward comparison involves comparing with those considered ‘inferior’ (Wood, 1989). Research shows that upwards comparison can serve to mediate the relationship between social media use and poor trait self-esteem, another important component of emotional wellbeing (Vogel, Rose, Roberts, & Eckles, 2014).

To date few studies have explored the relationship between social comparison on social media and maternal parenting and mental health. One study found a positive relationship between maternal social comparison and depression but did not include feeding in the parenting experiences (Coyne, McDaniel, & Stockdale, 2017). Higher levels of social

network social comparison were however found to be related to higher levels of depression and maternal role overload (feeling overburdened) and lower levels of parental competence (Coyne et al., 2017). Social media parental comparison, how parents compare their own parenting with that of others on social media, was investigated in a study of parents of children under the age of 18. Sidani, Shensa, Escobar-Viera, & Primack (2020) found that a 1-unit increase in reporting of parental social media comparison was associated with a 51% increased risk of elevated symptoms of depression. Further research into the effects of social comparison via social media, maternal mental health, and feeding experiences is needed to tell us more about these associations.

This prospective online survey study centres around two aims. The first is to understand more about the relationship between maternal antenatal infant feeding intentions, expectations, and experiences and the information received during the 28-week BFI feeding discussion routinely offered by midwives. The second aim is to explore how first-time mothers engage with social media and the interplay between social comparison, maternal mental health, and infant feeding experiences. The following five hypotheses were derived from these aims:

Relevant to the breastfeeding intention-behaviour gap:

H<sub>1</sub>. Mothers with a BIBG will have higher maternal anxiety and depression scores compared to mothers who met their breastfeeding intentions, after controlling for antenatal distress levels.

H<sub>2</sub>. Mothers with a BIBG will have a larger difference between feeding expectation and reality scores.

Relevant to social media and social comparison:

H<sub>3</sub>. Higher maternal social comparison scores will be associated with increased levels of

depression and anxiety, after controlling for distress in the antenatal period (time 1).

H<sub>4</sub>. Mothers with an intention-behaviour gap, will show elevated social comparison in the postnatal period (time 2).

If hypotheses 1, 3 and 4 are supported, the following mediation and moderation analyses can be tested.

H<sub>5</sub>. The relationship between the BIBG and maternal mental health will be mediated by social comparison.

H<sub>6</sub>. The association between the BIBG and maternal mental health will be stronger in mothers who report high social media use.

## **Key Messages**

- At 6 weeks postpartum, 43% of mothers in the sample reported a BIBG. UK infant feeding data indicates that 60% of women who plan to breastfeed exclusively were no longer doing so at 6 weeks (McAndrew et al., 2012).
- 97.5% (n=116) of mothers in the study initiated breastfeeding and 55% (n=65) were exclusively breastfeeding at 6 weeks.
- BIBG did predict postnatal maternal mental health outcomes, but this association did not hold once antenatal levels of depression and anxiety were accounted for.
- Consistent with existing research, antenatal symptoms of mental health difficulties (anxiety and depression) predicted postnatal mental health difficulties.
- Social comparison was significantly positively associated with levels of both postnatal depression and anxiety after controlling for antenatal mental health symptomatology.

## **Method**

### **Study Design**

This investigation reports a prospective study of first-time mothers with online survey data collected in the third trimester of pregnancy and 6-14 weeks postpartum. Ethical approval was granted by the Central University Research Ethics Committee (University of Liverpool) on the 4<sup>th</sup> September 2019 (see Appendix 3).

### **Participants**

Primiparous pregnant women in the third trimester of pregnancy (28-42 weeks) were recruited via online advertising on social media sites, aimed at and known to be accessed by new/expectant mothers, and by online promotion on Facebook and Twitter. Participants were given the option to partake in a prize draw to win £25 in vouchers at time 1 and £100 in vouchers at time 2. Inclusion criteria required participants to be aged 18 years or over, English speaking UK mothers, pregnant with their first child, in the third trimester of a singleton pregnancy, and intending to breastfeed predominantly or exclusively in the first three months postpartum. Primiparas were selected for inclusion due to them not having prior experience of feeding their own baby or of having experienced a feeding expectation-reality difference. All participants completed online participant information sheets (see Appendix 4) and informed consent forms (see Appendix 5) at each time point and demographic background information at time 1 (see Appendix 6). Participants who did not meet inclusion criteria at time 1 were directed to an online debrief sheet (see Appendix 7).

Participants were invited to complete a second survey when their baby was 6-14 weeks old (time 2) via a personalised email link to the survey. Participants whose babies were born

before 37 weeks or spent more than 24 hours separated from their babies in SCBU/NICU were not included in the study due to the effects of early extended separation on successful breastfeeding establishment. Participants excluded at time 2 were signposted to websites offering relevant information and support services, using a debrief (see Appendix 8).

## **Procedure**

Participants completed two surveys via the Qualtrics platform: the first during the third trimester of pregnancy and the second at 6-14 weeks postpartum. Each survey contained a battery of validated and researcher developed measures. To ensure confidentiality of personal data, Qualtrics automatically allocated a random identification number (RandomID) to all participants at time 1. Participants who, at the end of the first survey, consented to be contacted for participation at time 2 were asked to provide their email address and gestational age. Email addresses provided for this reason, or for prize draw entries, were collected in a secondary survey and stored separately to the data. Qualtrics then generated personalised time 2 survey invitations for each participant, allowing responses at both time points to be linked via the RandomID. These invitations were sent to participants when they were estimated to be 6 weeks postpartum, based on gestational age given at time 1. Anonymised data at each time point could then be downloaded from Qualtrics to SPSS and merged by the RandomID variable.

## **Measures**

### **Time 1 – Third Trimester of Pregnancy**

**Infant feeding – breastfeeding expectation/reality.** In the third trimester, women



were asked how they intended to feed their infant and, for those indicating that they planned to breastfeed, how long they planned to exclusively breastfeed or offer any breast milk (see Appendix 9). During the development of this researcher-derived measure, a list of potential questions was taken to an ‘Infant Nutrition and Perinatal Wellbeing Collaborative Research Group’ comprising of other researchers and professionals from Public Health and the infant feeding team at the local maternity hospital. A short presentation on the rationale for and aims of the current study was delivered and attendees offered feedback on the draft breastfeeding expectation/reality measure and made suggestions for additional questions based on their own knowledge and expertise. The final measure comprised of 22 researcher-derived items examining breastfeeding expectations in relation to information received at the 28-week feeding discussion. These items were all preceded by ‘I feel the information I received from my midwife about feeding my baby:’ and followed by statements about infant feeding such as ‘provided me with sufficient information about breastfeeding’ and ‘allowed me to make an informed decision about my feeding intention in pregnancy’ (see Appendix 10). A higher score indicated greater agreement with the statements and higher levels of perceived preparedness for aspects of infant feeding as described (each item was scored from 1-5 with a total score of 22-110). The 22-item breastfeeding expectation/reality scale demonstrated excellent internal consistency in the current sample with a Cronbach’s Alpha of  $\alpha = .98$  at time 1 and  $\alpha = .96$  at time 2.

**Maternal depression.** Maternal depressive symptoms were assessed using the Edinburgh Postnatal Depression Scale (*EPDS*; Cox, Holden, & Sagovsky, 1987), a 10-item self-report questionnaire administered to screen for depressive symptoms in the antenatal and postnatal period (see Appendix 11). The EPDS scores range from 0 to 30 with higher scores indicating higher depressive symptoms. Scores above 13 indicate an increased likelihood of

depressive illness (Cox et al., 1987). In the current sample, the EPDS demonstrated excellent internal consistency with a Cronbach's Alpha of  $\alpha = .90$  at both time points.

**Maternal anxiety.** Anxiety symptoms were assessed using the 7-item Generalised Anxiety Disorder Assessment (GAD-7; Spitzer, Kroenke, Williams & Lowe, 2006), an anxiety screening measure that has been validated for use in numerous settings including primary care and general population samples (see Appendix 12). The GAD-7 scores range from 0 to 21 with higher scores indicating higher anxiety symptomatology. Cut-off point scores of 5, 10, and 15 represent mild, moderate, and severe anxiety, respectively. In the current sample, the GAD-7 demonstrated good internal consistency with a Cronbach's Alpha of  $\alpha = .89$  at both time points.

**Social comparison.** Social Comparison Orientation was measured by the 11-item INCOM, Iowa-Netherlands Comparison Orientation Scale (Gibbons & Buunk, 1999). These measures explore the extent to which participants engage in social comparison with others and in which direction these comparisons occur (see Appendix 13). Scores range from 11 to 55, with higher scores indicating higher levels of social comparison. In the current sample, the INCOM demonstrated good internal consistency with a Cronbach's Alpha of  $\alpha = .82$  at time 1 and  $\alpha = .83$  at time 2.

**Social media use.** Social media usage was assessed with questions relating to the type, frequency, and duration of access to social media websites aimed at parents or with a parenting focus over the last 6 weeks. This included Facebook, Instagram and Twitter and other sites or blogs that relate to pregnancy and parenting such as Mumsnet, Emma's Diary, and Pinterest (see Appendix 14). Only mothers who endorsed usage of social media which

exposed them to other parents or websites with a parenting focus were included in the analysis. The scores for frequency of social media use at time 1 and time 2 were combined to generate a total social media use variable ranging from 0 to 70, where higher scores indicated higher frequency of use.

## **Time 2 – 6-14 Weeks Postpartum**

Delivery information was collected at time 2 including delivery method, gestation, and time spent apart following birth. Infant feeding outcome information was gathered regarding the initiation and continued feeding behaviour, feeding difficulties, and support accessed. The BIBG variable was derived from the breastfeeding intention information at time 1 and the infant feeding outcome information at time 2. Different responses at each time point indicated the presence of a BIBG whilst consistent responses were indicative of an absence of a BIBG. Where participants responses differed due to reporting increased breastfeeding behaviour, e.g. intending to mix feed but exclusively breastfeeding from birth, they were assigned to the absence of a BIBG group.

The EPDS, GAD-7, INCOM were repeated at both times points. The breastfeeding expectation items were also repeated but with a hindsight qualifier ('now that I have experience of feeding my own baby') to gauge how well mothers felt the BFI feeding discussion prepared them for the reality of infant feeding. The breastfeeding expectation-reality difference score was made by subtracting the BFI feeding discussion reality score (time 2) from the BFI feeding discussion expectation score (time 1). Higher scores represent mothers in the postpartum period feeling less prepared for the reality of infant feeding than they had expected to be during pregnancy, based on the 28-week BFI feeding discussion with

their midwives.

### **Power Calculation**

A power analysis for bivariate associations was conducted using G\*Power 3.1.9.4 (Faul, Erdfelder, Lang, & Buchner, 2007) which indicated that a sample size of 67 was needed to detect a medium effect size ( $r=.30$ , Cohen, 1988) with alpha set at 0.05 and power at 0.80. Based on guidance from Fritz & Mackinnon (2007), a sample size of 224 was needed to achieve .8 power for the partial-mediation condition H-H-small (where H is half-way between small and medium,  $\alpha = 0.26$ ,  $\beta = 0.26$ ,  $\tau' = 0.14$ ).

## Results

### Sample Characteristics

Full data on the variables of interest was acquired from 119 participants. At time 1, 611 women started the survey with 172 both meeting the eligibility criteria and having complete data. Of these 172 women, 119 [met the eligibility criteria and] completed the survey at time 2 (30.8% attrition, see Appendix 15 for a sample distribution by demographic factors for each time point). The 119 mothers who completed surveys at both time points were made up of women aged 18-42 (mean 29.65 years). Compared to mothers who only completed the survey at time 1, participants did not differ significantly in age, marital status, employment status, family income, level of education, breastfeeding expectation or symptoms of depression or anxiety but reported significantly higher levels of social comparison ( $t(167) = 2.95, p=.04$ ). For more detailed information about participation at both time points see the participant flow diagram (Appendix 16).

A total of 95.8% of women in the final sample were white British, 92% were married/cohabiting and 85% were in full-time employment in the antenatal period. Most women planned to exclusively breastfeed their baby (89%), 50% of women planned to exclusively breastfeed for less than 6 months and 75% of women planned to offer their baby breastmilk beyond 6 months of age. At time 2, babies were between 6 and 15 weeks old ( $M = 9.11$ ). Breastfeeding was initiated by 95.8% ( $N = 116$ ) of women in the sample and of the women who planned to breastfeed exclusively at time 1, 60% ( $n=64$ ) were successful in doing so up to time 2. Of the 13 women who planned to mixed feed their babies, 3 met their own feeding goals and were mixed feeding, 1 mother was exclusively breastfeeding and 9

were exclusively formula feeding at time 2. A total of 51 (43% of the total sample) women reported a BIBG. All mothers reported some social media use, 55% of women were exclusively breastfeeding, 16% were mixed feeding and 29% were exclusively formula feeding. Facebook was the most commonly used social media site with all but one mother (n=118) reporting using it and 96% (n=114) using it every day.

Mean breastfeeding expectation/reality scores were similar at each time point ( $M = 71.53$ ,  $SD = 22.32$  at time 1;  $M = 70.91$ ,  $SD = 19.04$  at time 2). The feeding expectation/reality difference scores ranged from -43 to 50 ( $M = 0.62$ ,  $SD = 18.18$ ). A positive score indicates that, based on information received in the 28-week BFI feeding discussion, a mother's perceived preparedness for aspects of infant feeding in the antenatal period was greater than her felt preparedness for the reality of infant feeding in the postnatal period. A total of 69 mothers (58%) reported feeling less well prepared for infant feeding than they had anticipated following their 28-week BFI discussion, as indicated by a positive difference score (expectation – reality  $\geq 1$ ).

## **Data Analysis**

Analyses were carried out using IBM SPSS Statistics v.25.

A linear regression was used to examine the relationship between BIBG and breastfeeding expectation-reality difference scores ( $H_2$ ). Hierarchical regression analyses were performed to examine the relationships between BIBG and depression and anxiety levels at time 2 ( $H_1$ ); BIBG and social comparison at time 2 ( $H_4$ ); social comparison and depression and anxiety levels at time 2 ( $H_3$ ); and the prediction that the association between

BIBG and depression and anxiety levels at time 2 would be moderated by social media use ( $H_6$ ). It was not possible to test the prediction that the relationship between the BIBG and depression and anxiety levels would be mediated by social comparison as assumptions for the mediation were not met (Baron & Kenny, 1986).

**Approach to skewed data.** The distribution of data was checked for all outcome variables. Skewness was indicated where the skewness statistic was greater than twice that of its standard error. Skewed variables were transformed with square root transformations. Raw data are presented as means and standard deviations whilst test statistics and p values, where applicable, derive from analyses using the transformed variables. See Appendix 17 for skewness statistics and histograms for untransformed and transformed data.

## **Hypothesis Testing**

**Hypothesis 1.** Mothers with a BIBG will have higher maternal anxiety and depression scores compared to mothers who met their breastfeeding intentions, after controlling for distress levels at time 1. In the analysis between BIBG and depression at time 2, EPDS depression score at time 1 was entered in the first step and BIBG was added in the second step. A hierarchical regression analysis was conducted to analyse the relationship between BIBG and depression at time 2. The overall regression model predicted approximately 29% of variance in depression at time 2 ( $R^2 = .29$ ,  $F(2, 116) = 23.45$ ,  $p < .001$ ). Depression score at time 1 was positively associated with and predicted approximately 28% of variance in depression score at time 2 ( $\beta = .52$ ,  $p < .001$ ). After controlling for depression at time 1, BIBG was not a significant predictor of depression score at time 2 ( $\beta = -.09$ ,  $p = .28$ ). See Table 3 for results.

Table 3

*Regression Analysis showing Depression at Time 1 and BIBG as Predictors of Depression at Time 2*

Variable	Cumulative		Simultaneous	
	R <sup>2</sup> - change	F-change	β	p
Step 1				
Depression at time 1	0.28	F(1,117)= 45.63	.52	<.001
Step 2				
BIBG	0.007	F(1, 116)= 1.19	-.09	.28

A further hierarchical regression analysis was conducted to analyse the relationship between BIBG and anxiety at time 2. GAD-7 anxiety score at time 1 was entered in the first step and BIBG was added in the second step. The overall regression model predicted approximately 26% of variance in anxiety at time 2 ( $R^2 = .26$ ,  $F(2, 116) = 20.36$ ,  $p < .001$ ). Anxiety score at time 1 was positively associated with and predicted approximately 26% of variance in anxiety score at time 2 ( $\beta = .51$ ,  $p < .001$ ). After controlling for anxiety levels at time 1, BIBG was not a significant predictor of anxiety at time 2 ( $\beta = -.02$ ,  $p = .82$ ). See Table 4 for results.



Table 4

*Regression Analysis showing Anxiety at Time 1 and BIBG as Predictors of Anxiety at Time 2*

Variable	Cumulative		Simultaneous	
	R <sup>2</sup> - change	F-change	$\beta$	p
Step 1				
Anxiety at time 1	0.26	F(1,117)= 41.00	.51	<.001
Step 2				
BIBG	<0.001	F(1, 116)= 0.05	-.02	.82

**Hypothesis 2.** Mothers with a BIBG will report a larger difference between feeding expectation and reality scores. The relationship between BIBG and breastfeeding expectation-reality difference scores was analysed using a linear regression. The regression model explained approximately 2% of variance in the breastfeeding expectation-reality difference score,  $R^2 = .02$ ,  $F(1, 117) = 3.42$ ,  $p = .07$ , and the BIBG was not significantly associated with the feeding expectation-reality difference score ( $\beta = 0.17$ ,  $p = .07$ ).

**Hypothesis 3.** Higher maternal social comparison scores will be associated with increased levels of depression and anxiety, after controlling for distress at time 1. In the analysis between social comparison and depression, depression score at time 1 was entered in the first step and social comparison score from time 1 was added in the second step. The overall regression model explained approximately 33% of variance in depression at time 2 ( $R^2 = .33$ ,  $F(2, 116) = 23.45$ ,  $p < .001$ ). Depression at time 1 was positively associated with, and explained approximately 28% of variance in, depression score at time 2 ( $\beta = .53$ ,  $p < .001$ ). After controlling for depression at time 1, social comparison was positively associated with, and explained approximately 5% of variance in, depression at time 2 ( $\beta = .23$ ,  $p = .005$ ). See Table 5 for results.

Table 5

*Regression Analysis showing Depression and Social Comparison at Time 1 as Predictors of Depression at Time 2*

Variable	Cumulative		Simultaneous	
	R <sup>2</sup> - change	F-change	$\beta$	p
Step 1				
Depression at time 1	0.28	F(1,117)= 45.63	.53	<.001
Step 2				
Social comparison at time 1	0.05	F(1, 116)= 8.01	.23	.005

In the analysis between social comparison and anxiety, anxiety score at time 1 was entered in the first step and social comparison score from time 1 was added in the second step. The overall regression model explained approximately 33% of the of variance in anxiety at time 2 ( $R^2 = .33$ ,  $F(2, 116) = 28.68$ ,  $p < .001$ ). Anxiety at time 1 was positively associated with, and explained approximately 26% of variance in, anxiety score at time 2 ( $\beta = .51$ ,  $p < .001$ ). After controlling for anxiety at time 1, social comparison was positively associated with, and explained approximately 7% of variance in, anxiety at time 2 ( $\beta = .28$ ,  $p = .001$ ). See Table 6 for results.

Table 6

*Regression Analysis showing Anxiety and Social Comparison at Time 1 as Predictors of Anxiety at Time 2*

Variable	Cumulative		Simultaneous	
	R <sup>2</sup> - change	F-change	$\beta$	p
Step 1				
Anxiety at time 1	0.26	F(1,117)= 41.00	.51	<.001
Step 2				
Social comparison at time 1	0.07	F(1, 116)= 12.36	.28	.001

**Hypothesis 4.** Mothers with a BIBG will show elevated social comparison at time 2. In the hierarchical regression analysis between social comparison at time 2 and BIBG, social comparison score at time 1 was entered in the first step and the BIBG variable was added in the second step. The overall regression model explained approximately 42% of variance in social comparison at time 2 ( $R^2 = .42$ ,  $F(2, 116) = 41.35$ ,  $p < .001$ ). Social comparison at time 1 predicted approximately 42% of variance in social comparison at time 2 ( $\beta = .65$ ,  $p < .001$ ). After controlling for social comparison at time 1, BIBG was not a significant predictor of social comparison at time 2 ( $\beta = -.04$ ,  $p = .62$ ). See Table 7 for results.

Table 7

*Regression Analysis showing Social Comparison at Time 1 and BIBG as Predictors of Social Comparison at Time 2*

Variable	Cumulative		Simultaneous	
	R <sup>2</sup> - change	F-change	$\beta$	p
Step 1				
Social comparison at time 1	0.42	F(1,117)= 82.98	.65	<.001
Step 2				
BIBG	0.001	F(1, 116)= 0.25	-.04	.62

**Hypothesis 5.** The relationship between the BIBG and maternal mental health will be mediated by social comparison. It was not possible to test H<sub>5</sub>. Hypothesis 1 was not supported; therefore, the assumptions of mediation analysis were not met (Baron & Kenny, 1986).

**Hypothesis 6.** The association between the BIBG and maternal mental health will be stronger in mothers who report high social media use. In a hierarchical regression testing whether the relationship between BIBG and depression at time 2 was moderated by social media use, the main effects of frequency of social media use (total from time 1 and time 2) and BIBG were entered in the first block and a BIBG by social media use interaction term, using a mean centred total social media use variable (total social media use - mean), was entered in the second. The overall regression model was non-significant and predicted only approximately 5% of variance in depression at time 2 ( $R^2 = .05$ ,  $F(3, 115) = 1.81$ ,  $p = .15$ ). The interaction term was non-significant ( $\beta = -.12$ ,  $p = .40$ ), indicating that social media use did not moderate the link between BIBG and depression at time 2. See Table 8 for results.

Table 8

*Regression Analysis showing Social Media Use, BIBG and Interaction of Social Media and BIBG as Predictors of Depression at Time 2*

Variable	Cumulative		Simultaneous	
	R <sup>2</sup> - change	F-change	β	p
Step 1				
Frequency of social media use at T1 & T2	0.04	F(2,116)= 2.35	.21	.15
BIBG			-.19	.05
Step 2				
Interaction of social media use and BIBG	0.004	F(3, 115)= 0.72	-.12	.40

A second hierarchical multiple regression analysis was conducted to test whether the relationship between BIBG and anxiety at time 2 was moderated by social media use. The main effects of frequency of social media use (total from time 1 and time 2) and BIBG were entered in step 1 and then the interaction term between social media and BIBG was added in the second step. The overall regression model was non-significant and predicted approximately 3% of variance in anxiety at time 2 ( $R^2 = .03$ ,  $F(3, 115) = 1.19$ ,  $p = .32$ ). The interaction term was non-significant ( $\beta = -.05$ ,  $p = .75$ ) indicating that social media use did not moderate the link between BIBG and anxiety at time 2. See Table 9 for results.

Table 9

*Regression Analysis showing Social Media Use, BIBG and Interaction of Social Media and BIBG as Predictors of Anxiety at Time 2*

Variable	Cumulative		Simultaneous	
	R <sup>2</sup> - change	F-change	$\beta$	p
Step 1				
Frequency of social media use at T1 & T2	0.03	F(2,116)= 1.75	.19	.18
BIBG			-.10	.30
Step 2				
Interaction of social media use and BIBG	0.001	F(3, 115)= 0.10	-.05	.75

### **Bivariate Associations**

Research suggests that social comparison is associated with symptoms of depression in adolescents (Nesi & Prinstein, 2015), maternal age is positively associated with postpartum depression (Muraca, & Joseph, 2014), and maternal education is positively associated with breastfeeding initiation and duration (Sarki, Parlesak, & Robertson, 2019). As a result, maternal age and maternal education were explored via bivariate associations with outcome and predictor variables at time 1 and time 2. Bivariate associations between the control variables (maternal age and education) and time 1 and time 2 predictor and outcome variables were examined using parametric analyses (see Appendix 18). Pearson's *r* correlations were used for continuous transformed data and independent *t*-tests were used to examine associations between categorical indices and continuous outcomes where appropriate.

Correlations between variables were largely as expected given the results described above; antenatal mental health difficulties were significantly positively correlated with postnatal mental health difficulties, social comparison at time 1 was significantly positively correlated with social comparison at time 2, and social comparison at both time points were positively correlated with mental health difficulties at both time points. Interestingly, the BFI expectation-reality difference score was significantly negatively correlated with levels of anxiety and depression at time 1 but not time 2. That is, mothers who reported feeling more prepared for infant feeding in pregnancy than in the postpartum period reported lower levels of antenatal anxiety and depression. It could be that perceived preparedness for infant feeding acted as a buffer against antenatal depression and anxiety, although more work is needed to explore this further.

Maternal age was significantly positively correlated with maternal education ( $r=.43$ ,  $p<.01$ ) and negatively correlated with anxiety at time 1 ( $r=-.21$ ,  $p<.05$ ), but not correlated with any other outcome or predictor variables. Maternal education was also negatively correlated with anxiety at time 1 ( $r=-.22$ ,  $p<.05$ ). Maternal age and maternal education were added to the regression model of hypothesis 3 with anxiety and social comparison at time 1 as predictors of anxiety at time 2 to test whether they added to the explained variance or altered the existing contribution of the predictor variables. Anxiety score at time 1, maternal age, and maternal education were entered in the first step and social comparison score from time 1 was added in the second step. The overall regression model explained approximately 33% of the variance in anxiety at time 2 ( $R^2 = .33$ ,  $F(4, 114) = 14.10$ ,  $p <.001$ ). Anxiety at time 1, maternal age, and maternal education explained approximately 26% of variance in anxiety score at time 2 although only anxiety score at time 1 was a significant predictor ( $\beta = .51$ ,  $p<.001$ ). After controlling for anxiety at time 1, maternal age, and maternal education, social

comparison was positively associated with, and explained approximately 7% of variance in, anxiety at time 2 ( $\beta = .28$ ,  $p = .001$ ). See Table 10 for results. Maternal age and education were not significant predictors in the model, nor did they improve the model fit by explaining any additional variance. Therefore, the original model, with fewer variables, is retained.

Table 10

*Regression Analysis showing Maternal Age, Maternal Education, Anxiety at Time 1, and Social Comparison at Time 1 as Predictors of Anxiety at Time 2*

Variable	Cumulative		Simultaneous	
	R <sup>2</sup> - change	F-change	$\beta$	p
Step 1				
Anxiety at time 1	0.26	F(3, 115)= 13.46	.51	<.001
Maternal age			.01	.88
Maternal education			-.02	.84
Step 2				
Social comparison at time 1	0.07	F(4, 114)= 14.10	.28	.001



## Discussion

The study hypotheses centred around two aims. The first was to understand more about the relationship between maternal antenatal infant feeding intentions, expectations, and experiences and the information received during the 28-week BFI feeding discussion. The second aim was to explore how first-time mothers engage with social media and the interplay between social comparison, maternal mental health, and infant feeding. From these aims five hypotheses were derived and tested.

At time 2 ( $M = 9.11$  weeks postpartum) 43% of all mothers in this study reported having a BIBG and of those who planned to breastfeed exclusively 60% ( $n=64$ ) were successful in doing so. As expected, given that inclusion criteria included intention to breastfeed, 97.5% (116) of mothers initiated breastfeeding. Of those who planned to exclusively breastfeed, 60% were exclusively breastfeeding at time 2 ( $M = 9.11$  weeks), a considerably higher figure than the 40% recorded by the UK Feeding Survey in 2010 (McAndrew et al., 2012). Contrary to hypothesis 1, mothers with a BIBG did not report higher levels of maternal anxiety and depression compared to mothers who did meet their breastfeeding intentions, after controlling for distress levels at time 1. BIBG did predict depression and anxiety levels at time 2, but this did not hold after including time 1 depression and anxiety levels in the model. This means that BIBG does not predict postnatal levels of anxiety and depression over and above prenatal levels; prenatal mental health is the most robust predictor of postnatal mental health. This finding emphasizes the importance of routine and good quality mental health screening in antenatal appointments to protect against adverse postnatal mental health outcomes. Future studies could look at the effects of BIBG in mothers stratified by level of antenatal depression and anxiety (or with clinically significant

mental health difficulties) to explore whether the presence of a BIBG differentially affects the postnatal mental health outcomes in these two groups. Splitting the sample in the current study would have resulted in low numbers in each group and underpowered analyses.

Mothers with a BIBG did not have larger breastfeeding expectation-reality difference scores meaning that, based on the BFI 28-week feeding discussion, mothers with a BIBG did not feel less prepared for infant feeding in the postpartum period than they expected they were during pregnancy. This implies that mothers have other more salient reasons for not meeting their own breastfeeding goals. Information about feeding difficulties and support accessed was collected in the survey at time 2 but the data were not examined for this paper. The BFI expectation and reality data were both collected retrospectively so may be subject to recall error. Furthermore, the time between BFI feeding discussion and reporting at time 1 was not controlled for as many mothers could not recall when this discussion had taken place ( $n=49$ , 41%). This may reflect quality or balance of received infant feeding information with some mothers not aware of having been party to an explicit feeding discussion. Further exploration of the data, in terms of difference in reporting of those who were able to recall the date of the discussion and those who were not, could provide important information. Qualitative data were also collected in terms of how helpful mothers found the support they received, although entering this via free text was optional. Future studies should examine this data to explore differences in difficulties and support in mothers with and without a BIBG.

There were 69 mothers (58%) in the sample who reported that they did not feel as prepared for the reality of infant feeding as they had expected to be in pregnancy (as evidenced by their BFI feeding discussion expectation > BFI reality scores). This has important implications for the routine delivery of antenatal feeding information to first-time

mothers. This study found that 43% (n= 51) of mothers who had planned to exclusively breastfeed were offering at least some formula to their infants in the early postnatal period (M = 9.11 weeks postpartum). Worryingly, only 10% of mothers (n= 12) at time 1 and 13% of mothers (n= 16) at time 2 agreed that the BFI feeding discussion had allowed them to feel confident about formula feeding their baby. This supports existing literature which has found that mothers report receiving very little information about bottle-feeding (Lakshman et al., 2009). Whilst a number of mothers in the current study may not have actively sought out information about the safe preparation, storage and use of formula during pregnancy as they were planning to exclusively breastfeed, this is needed urgently once exclusive breastfeeding becomes unsustainable. The implications to infant health if formula is not used correctly can lead to tragedy. Research indicates that errors are commonly made in the reconstitution of breast milk substitutes (Lakshman et al., 2009; Renfrew, Lang, Martin, & Woolridge, 2000). Research has shown that more mothers are seeking information from family/other mothers or from the internet than from health professionals, increasing risks of information being anecdotal or outdated (Fallon et al., 2017). It is therefore imperative that expectant mothers are given accurate information by health professionals about both breast and formula feeding in the antenatal period alongside information about possible challenges and support available.

Regression analyses indicated that social comparison was positively associated with postpartum depression, after controlling for depression in the antenatal period. Similarly, social comparison was found to be associated with postpartum anxiety, after controlling for antenatal anxiety. This adds to the existing cross-sectional research on associations between social comparison in mothers and mental health symptoms (Coyne et al., 2017) by replicating the finding in a prospective study with directional effects. A recent systematic review of the association of social comparison with depression and anxiety identified 60 relevant studies

(McCarthy & Morina, 2020). The studies had a mix of clinical and subclinical populations with depression and anxiety and included both males and females, children and adolescents, people with intellectual disabilities, and inpatient and outpatient cohorts. The studies did not appear to explicitly report on perinatal samples. The literature concerning the relationship between anxiety and social comparison is sparse in comparison to depression, and overall methods of social comparison measurement were heterogeneous. Nonetheless, the systematic review concluded that social comparison has a significant association with both depression and anxiety. It may be that the mechanism of this association, for women in the perinatal period, is through the relationship between social comparison and body dissatisfaction (Myers & Crowther, 2009), which we know to be associated with antenatal and postnatal depression (Chan et al., 2020; Clark, Skouteris, Wertheim, Paxton, & Milgrom, 2009) and antenatal anxiety (Chan et al., 2020). The current study found that the overall regression models explained 33 % of the variance in both anxiety and depression at time 2. However, after controlling for anxiety at time 1, social comparison explained 7% of the variance in anxiety at time 2 (compared to 5% of the variance in depression at time 2, after controlling for depression at time 1). A possible explanation for this could be through social comparison (and perceived sociocultural pressures) being associated with anxiety regarding conforming to unrealistic ideals of how a woman's body should look in the early postpartum period. Again, this could operate through body dissatisfaction and more work is needed to explore this.

### **Strengths and Limitations**

A key strength of this study was the prospective design and the use of a BIBG variable that, to our knowledge, has not been measured in this way before. Collecting data

about infant feeding intention in pregnancy serves to eliminate recall bias and, together with collection of concurrent feeding method at time 2, allowed for the generation of an accurate measure of BIBG.

The 6-week exclusive breastfeeding rates reported in this study were higher than those reported in the recent literature. This may be a result of sampling bias due to the opt-in design of the study or may reflect a more recent trend in breastfeeding behaviour, given that the current most comprehensive infant feeding survey is now over ten years old (McAndrew et al., 2012). More than half of the mothers in the current sample did not have a BIBG (57%), perhaps due to the second time point being completed relatively early in the postnatal period. This study may have benefitted from a further wave of assessment when the babies were 6 months old as 87% of mothers (n= 104) reported in pregnancy that they planned to breastfeed beyond 6 weeks postpartum. A third time point would clarify whether these mothers met their own long term breastfeeding goals rather than just those of successful breastfeeding establishment. This would also allow direct comparison with other breastfeeding duration studies and WHO exclusive breastfeeding guidance. It may not be beneficial to study beyond 6 months as research shows that the levels of exclusive breastfeeding at 6 months are as low as 1% (McAndrew et al., 2012).

Mothers who participated and gave full data at both times points were found to report significantly higher levels of social comparison than those who gave antenatal data only. This may be a result of the sampling process and those who engage more regularly in social comparison looking to align themselves with others via social media or through participation in surveys where included items can be assumed to be relevant to at least part of the population.

A key limitation of the study is that the time frame of when women completed the survey at time 2 was very wide indeed (between 6 and 15 weeks,  $M = 9.11$ ) and this was not accounted for in the analyses. The range of 6-15 weeks is a substantial time frame where infant development and feeding patterns and routines are concerned and including this in the analyses would have been beneficial to interpretation. The time frame within which the survey at time 1 was completed could also be a limitation in that we cannot be certain that women had already had an infant feeding discussion with their midwife. It may be that infant feeding had been mentioned briefly outside of this formal conversation and women mistakenly report on their experience of this. It is not possible to ascertain whether this occurred from the data as it was collected.

Lastly, the attrition rates for participation at time 1 were high and many women began the survey who were not eligible to do so (e.g. 130 women who were not first-time mothers). This may have been due to a lack of clarity in the advertisement and social media posts containing the link to participation. The advertisement was shared on social media by several wide-reaching groups/figures relevant to parenting and breastfeeding, such as The Association of Breastfeeding Mothers and Just a Normally Mummy (blogger). This may have resulted in the information in the advertisement receiving less attention than the content of the post by the author.

## **Clinical Implications**

A BIBG predicts postnatal depression, but this does not hold after including antenatal depression in the model; BIBG does not predict postnatal depression over and above antenatal depression. However, a BIBG might exacerbate existing antenatal levels of anxiety or depression. It would be helpful for clinicians working with mothers in the early postnatal period to ask about feeding intentions and behaviour to help evaluate risk for postnatal

depression where antenatal depression information is not available. Presence of a BIBG could serve as a prompt for clinicians to complete a depression or anxiety screening tool where normally they might ask a single question about mental health in a short, routine appointment. This could potentially be a less intrusive or threatening way to ask about mental health difficulties where clinicians work in teams and are unable to establish or maintain relationships throughout the perinatal period. Still, antenatal mental health assessment is vital as this is the best predictor of postnatal mental health outcomes above and beyond infant feeding experiences.

Social comparison scores predicting levels of both anxiety and depression in the postnatal period, after controlling for antenatal distress, points to the potential importance of social comparison screening in the perinatal period. The social comparison scale used in this study (INCOM; Gibbons & Buunk, 1999) contains 11 items but a shortened form containing 6 items has been validated and shown excellent model fit (Schneider & Schupp, 2011). This 6-item social comparison measure, alongside depression and anxiety measures, in routine appointments with GPs, midwives or health visitors could be beneficial to stratify by risk and make a record to screen and monitor for anxiety and depression levels in future appointments.

## **Future Research**

Future research should look to follow up the sample beyond 6 weeks postpartum to 6 or even 12 months to gain a more complete estimate of BIBG and explore whether this is associated with mental health difficulties in the longer-term. Women in the study gave information about feeding intention to 6 months and beyond so a BIBG variable could be derived for several time points. This would also mean that the data could be examined with

respect to WHO guidance about exclusive and any breastfeeding. The first weeks after birth are a period of adjustment, whether a first-time mother or otherwise (Hall et al., 2014). Once feeding method and care routines are established, mothers may then have the space to begin to reflect more on their emotions and loss attached to their feeding goals not being met.

Data about the NHS Trust that participants were receiving their maternity care from was obtained at time 1. Not all NHS Trusts have achieved or retained BFI Accreditation via its three-stage programme. Future research should look to examine outcomes using BFI Accreditation as a predictor although a larger sample may be necessary to retain statistical power.

As findings indicate that the BFI feeding discussion does not always fully meet the needs of first-time mothers, it is important to explore this to improve service delivery. A qualitative study examining mothers' views about the BFI feeding discussion at similar time points to those herein would add valuable information about how this discussion can better meet the needs of the mothers it serves. It would also be useful to build a picture of how this discussion varies across NHS Trusts, particularly those with/without BFI accreditation. This could be done quantitatively with data similar to that described in the current study or could be done qualitatively in research or practice with service user involvement groups.

## **Conclusions**

Overall, this study aimed to increase the understanding of the relationships between infant feeding intentions, expectations, and experiences, the antenatal BFI feeding discussion, social media and the interplay between social comparison, and maternal mental health. This



was done through the generation of a BIBG variable that has not previously been studied. A better understanding of these relationships might inform the development of support services that are able to identify mothers at risk of adverse postnatal mental health outcomes by implementing timely and appropriate, targeted interventions. The study findings identified that a proclivity for social comparison in pregnancy predicts postpartum mental health difficulties over and above mental health difficulties in the antenatal period. The importance of antenatal mental health in predicting postnatal mental health outcomes was also indicated. It is hoped that further research can be undertaken to expand our understanding of the BIBG and social comparison in larger samples and over an extended time frame to improve antenatal feeding information provision and mental health support in the perinatal period.

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## Appendix 1: PICOS Search Strategy

	Description	Search Strategies
<b>Population</b>	Human mothers, $\geq 18$ years old, without a current eating disorder/body dysmorphic disorder or severe and current mental health difficulty. Mothers whose infant feeding decision would not be based on specialist clinical advice. Mothers whose infant did not have a medical condition known to affect feeding.	Mother* OR Maternal
<b>Intervention</b>	Breastfeeding intention, initiation, maintenance, behaviour/status and/or duration.	Breast*Fe* OR "Infant Feeding" OR "Formula Fe*" OR "Bottle Fe*" OR Bottlef*d OR "Infant Feeding Behavio?r" OR "Infant Feeding Intent*" OR "Exclusive* Breastfe*" OR "Artificial Milk Feeding" OR Lactation OR "Breast Milk" OR "Human Milk"
<b>Comparator</b>	Not applicable	
<b>Outcomes</b>	Female body image, body concerns or body dissatisfaction	"Body Image" OR "Body Satisfaction" OR "Body Dissatisfaction" or "Positive Body Image" OR "Negative Body Image" OR Self-Image OR "Body Weight" OR "Body Shape" OR "Body Size" OR "Body Appearance" OR "Body Representation" OR "Body Schema" OR Appearance OR "Body Concern*" OR "Body Attitude" OR Self-Perception
<b>Study design and setting</b>	English language, peer reviewed studies or doctoral theses carried out in developed countries	

## Appendix 2: PRISMA Checklist

### *PRISMA Checklist*

Section/topic	#	Checklist item	Reported on page #
<b>TITLE</b>			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
<b>METHODS</b>			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	

Section/topic	#	Checklist item	Reported on page #
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., $I^2$ ) for each meta-analysis.	
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
<b>RESULTS</b>			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
<b>DISCUSSION</b>			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	
<b>FUNDING</b>			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A

**PRISMA 2009 Checklist** (Moher, Liberati, Tetzlaff, Altman, & Prisma Group, 2009)

## Appendix 3: University Ethics Approval



Central University Research Ethics Committee A

4 September 2019

Dear Dr Harrold

I am pleased to inform you that your application for research ethics approval has been approved. Application details and conditions of approval can be found below. Appendix A contains a list of documents approved by the Committee.

### Application Details

Reference:	4638
Project Title:	Infant feeding information in pregnancy and feeding experiences after birth: Impact of maternal expectations, wellbeing and social media comparisons.
Principal Investigator/Supervisor:	Dr Jo Harrold
Co-Investigator(s):	Dr Kate Abbott, Dr Vicky Fallon
Lead Student Investigator:	-
Department:	Psychological Sciences
Approval Date:	04/09/2019
Approval Expiry Date:	Five years from the approval date listed above

The application was **APPROVED** subject to the following conditions:

### Conditions of approval

- All serious adverse events must be reported to the Committee ([ethics@liverpool.ac.uk](mailto:ethics@liverpool.ac.uk)) in accordance with the procedure for reporting adverse events.
- If you wish to extend the duration of the study beyond the research ethics approval expiry date listed above, a new application should be submitted.
- If you wish to make an amendment to the study, please create and submit an amendment form using the research ethics system.
- If the named Principal Investigator or Supervisor changes, or leaves the employment of the University during the course of this approval, the approval will lapse. Therefore it will be necessary to create and submit an amendment form within the research ethics system.
- It is the responsibility of the Principal Investigator/Supervisor to inform all the investigators of the terms of the approval.

Kind regards,

Central University Research Ethics Committee A

[ethics@liverpool.ac.uk](mailto:ethics@liverpool.ac.uk)

CURECA



#### **Appendix - Approved Documents**

(Relevant only to amendments involving changes to the study documentation)

The final document set reviewed and approved by the committee is listed below:

Document Type	File Name	Date	Version
Debriefing Material	Debrief Time 1	17/04/2019	V1
Debriefing Material	Debrief Time 2	17/04/2019	V1
Questionnaire	Live survey links	04/06/2019	1
Debriefing Material	Debrief T1 complete	19/08/2019	1
Advertisement	Research Advert	19/08/2019	2 - Aug 2019
Participant Consent Form	TP2 Consent form version 2	19/08/2019	TP2 version 2
Participant Consent Form	TP1 Consent form version 2	19/08/2019	TP1 version 2
Study Proposal/Protocol	Kate Abbott Research Proposal Final August 2019	19/08/2019	Version 2
Participant Information Sheet	Participant information sheet TP1 final	30/08/2019	TP1 version 2
Participant Information Sheet	Participant information sheet TP2 final	30/08/2019	TP2 version 2

## Appendix 4: Participant Information Sheets from Time Point 1 and 2

### Participant Information Sheet Time 1



**Study Title - Infant feeding information in pregnancy and feeding experiences after birth: Impact of maternal expectations, wellbeing and social media comparisons.**

**You are being invited to participate in a research study. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask if you would like more information or if there is anything that you do not understand. We would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.**

**What is the purpose of the study?**

The purpose of the study is to explore the information that first time mothers receive about infant feeding. We are interested in finding out how well prepared and supported mothers feel to make informed decisions about infant feeding and how the information received equips and supports mothers to prepare for infant feeding. The study also aims to explore how new and expectant mothers use social media and how comparing ourselves to others on social media may affect wellbeing and infant feeding experiences.

**Why have I been chosen to take part?**

You have been invited to take part because you reside in the UK, are English speaking, aged 18 or over and are in the third trimester of your pregnancy with your first singleton baby.

**Do I have to take part?**

It will be up to you to decide whether or not you would like to take part. If you agree, and change your mind later, you can withdraw from the study without incurring a disadvantage.

**What will happen if I take part?**

- We will ask you to complete two online questionnaires, one in your third trimester of pregnancy (i.e. >28 weeks) and one when your baby is between 6 and 14 weeks old.
- At each time point you will be taken to a secure website to complete the questionnaires.
- The first questionnaire will ask about your wellbeing, feelings and experiences during your pregnancy, information you have received about infant feeding based on the discussions you have had with your midwife and your infant feeding plans. You will also be asked about your use of social media in terms of the websites you access, the frequency you access these sites and how you engage with social media.
- The second questionnaire will ask about your wellbeing, feelings and experiences since your baby has been born and about your infant feeding experiences. You will be asked again about your use of social media.
- At each time point the questionnaire should take approximately 25 minutes to complete.

## Participant Information Sheet Time 1

- We will provide you with a full explanation of the study when you are finished, along with details of relevant support networks should you require any further information or advice.
- You will have the option to take part in a prize draw to win £25 in vouchers when completing the first questionnaire and £100 in vouchers when completing the second.

### **How will my data be used?**

*The University processes personal data as part of its research and teaching activities in accordance with the lawful basis of 'public task', and in accordance with the University's purpose of "advancing education, learning and research for the public benefit.*

*Under UK data protection legislation, the University acts as the Data Controller for personal data collected as part of the University's research. The Supervisor acts as the Data Processor for this study, and any queries relating to the handling of your personal data can be sent to Dr Joanne Harrold (contact details below).*

*Further information on how your data will be used can be found in the table below.*

How will my data be collected?	Online questionnaire via Qualtrics (a web-based survey tool used to conduct survey research) at two time points.
How will my data be stored?	Data will initially be collected and stored on the Qualtrics system. Subsequently it will be stored on a password protected computer on a secure University server.
How long will my data be stored for?	Data will be deleted from the Qualtrics system when transferred to the secure server. It will be stored on the server for 10 years.
What measures are in place to protect the security and confidentiality of my data?	You will not be asked for any identifiable information.
Will my data be anonymised?	Information is anonymised in the questionnaire – we do not ask for your name
How will my data be used?	Findings will be written up within a Doctorate in Clinical Psychology thesis. Publication will be sought with peer reviewed journals. Results may also be used for a conference presentation.
Who will have access to my data?	Only the research student, Kate Abbott, and the supervisory team (Drs Jo Harrold

## Participant Information Sheet Time 1

	and Vicky Fallon) will have access to individual responses.
Will my data be archived for use in other research projects in the future?	Data will not be used for other projects
How will my data be destroyed?	Data will be deleted from the server after 10 years

### **Are there any risks in taking part?**

There are no known or likely risks to you if you take part in the study. However, some individuals may find questions relating to their own mental health and parenting experiences upsetting. If you feel that answering questions about these topics would be too distressing, we advise you not to take part. Questions relating to the above topics have a 'prefer not to say' option which you can tick if you wish. Other sections of the survey which contain sensitive items can be skipped if you wish too. You are also reminded that if at any point you should experience any discomfort or disadvantage as part of the research you are free to withdraw without giving a reason. If you are unhappy with any aspect of the study, please feel free to contact the researcher and we will try to help. The research team are not clinically trained and cannot provide therapeutic help or support for those in distress. There are contact details for UK support agencies in the participant debrief which we advise you to access if you feel like you may need additional support.

### **Are there any benefits in taking part?**

There are no direct benefits in taking part in this study. However, the outcomes of the research may help mothers and families in the future.

### **What will happen to the results of the study?**

The overall results of the study will be reported in a Doctorate in Clinical Psychology thesis and may be published in academic journals or presented at conferences. It will not be possible to identify individual participants.

### **Expenses and / or payments**

You will not receive payment for participating in this study but will have the option to take part in a prize draw to win £25 in vouchers when completing the first questionnaire and £100 in vouchers when completing the second.

### **What will happen if I want to stop taking part?**

You may withdraw your participation in the study at any time, without explanation. During the study you may withdraw by closing the questionnaire. As the survey is anonymous, data collected up to the point of withdrawal will still be used. Due to the information you provide being anonymised, you will also be unable to ask for access to, or to request the destruction of, that information once the questionnaire has been completed and submitted.

### **What if I am unhappy or if there is a problem?**

If you are unhappy, or if there is a problem, please contact the researcher at the address below and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Ethics and Integrity Office at [ethics@liv.ac.uk](mailto:ethics@liv.ac.uk). When contacting the Research Ethics and Integrity Office,



## **Participant Information Sheet Time 1**

please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

The University strives to maintain the highest standards of rigour in the processing of your data. However, if you have any concerns about the way in which the University processes your personal data, it is important that you are aware of your right to lodge a complaint with the Information Commissioner's Office by calling 0303 123 1113.

### **Will my participation be kept confidential?**

All the information collected about you during the course of the research will be anonymous. The data collected in this study will be stored on a password protected computer and all data will remain confidential. Only the researcher, Kate Abbott, and her supervisory team will have access to the data. It will not be made publically available. The Data Controllers for the study is Dr Joanne Harrold ([harrold@liverpool.ac.uk](mailto:harrold@liverpool.ac.uk)) and the University Data Protection Officer, Mrs Victoria Heath, can be contacted on 0151 794 2148.

### **Who can I contact if I have further questions?**

Dr Joanne Harrold, Eleanor Rathbone Building, Bedford Street South, University of Liverpool, Liverpool, L69 7ZA,  
Email: [harrold@liverpool.ac.uk](mailto:harrold@liverpool.ac.uk)  
Tel: +44 (0)151 795 8513

## Participant Information Sheet Time 2



### **Study Title - Infant feeding information in pregnancy and feeding experiences after birth: Impact of maternal expectations, wellbeing and social media comparisons.**

You are being invited to participate in the second part of a research study. Before you decide whether to participate again, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask if you would like more information or if there is anything that you do not understand. We would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

#### **What is the purpose of the study?**

The purpose of the study is to explore the information that first time mothers receive about infant feeding. We are interested in finding out how well prepared and supported mothers feel to make informed decisions about infant feeding. The study also aims to explore how new and expectant mothers use social media and how comparing ourselves to others on social media may affect wellbeing and infant feeding experiences.

#### **Why have I been chosen to take part?**

You have been invited to take part because you reside in the UK, are English speaking, aged 18 or over, have a baby that was born at full term (>37 weeks), was not separated from you in a Special Care Baby Unit (SCBU) or Neonatal Intensive Care Unit (NICU) and is currently between 6-14 weeks old and because you have previously taken part when you were pregnant.

#### **Do I have to take part?**

It will be up to you to decide whether or not you would like to take part. If you agree, and change your mind later, you can withdraw from the study without incurring a disadvantage.

#### **What will happen if I take part?**

- We will ask you to complete a further online questionnaire
- You will be taken to a secure website to complete the questionnaire.
- The questionnaire will ask about your wellbeing and feelings since your baby has been born and about your infant feeding experiences. You will be asked again about your use of social media.
- The questionnaire should take approximately 25 minutes to complete.
- We will provide you with a full explanation of the study when you are finished, along with details of relevant support networks should you require any further information or advice.
- You will have the option to take part in a prize draw to win £100 in vouchers

#### **How will my data be used?**

*The University processes personal data as part of its research and teaching activities in accordance with the lawful basis of 'public task', and in accordance with the University's purpose of "advancing education, learning and research for the public benefit.*

*Under UK data protection legislation, the University acts as the Data Controller for personal data collected as part of the University's research. The Supervisor acts as the Data Processor for this study, and any queries relating to the handling of your personal data can be sent to Dr Joanne Harrold (contact details below).*

*Further information on how your data will be used can be found in the table below.*

How will my data be collected?	Online questionnaire via Qualtrics (a web-based survey tool used to conduct survey research) at two time points.
How will my data be stored?	Data will initially be collected and stored on the Qualtrics system. Subsequently it will be stored on a password protected computer on a secure University server.
How long will my data be stored for?	Data will be deleted from the Qualtrics system when transferred to the secure server. It will be stored on the server for 10 years.
What measures are in place to protect the security and confidentiality of my data?	You will not be asked for any identifiable information.
Will my data be anonymised?	Information is anonymised in the questionnaire – we do not ask for your name
How will my data be used?	Findings will be written up within a Doctorate in Clinical Psychology thesis. Publication will be sought with peer reviewed journals. Results may also be used for a conference presentation.
Who will have access to my data?	Only the research student, Kate Abbott, and the supervisory team (Drs Jo Harrold and Vicky Fallon) will have access to individual responses.
Will my data be archived for use in other research projects in the future?	Data will not be used for other projects
How will my data be destroyed?	Data will be deleted from the server after 10 years

**Are there any risks in taking part?**

There are no known or likely risks to you if you take part in the study. However, some individuals may find questions relating to their own mental health and parenting experiences upsetting. If you feel that answering questions about these topics would be too distressing, we advise you not to take part. Questions relating to the above topics have a 'prefer not to say' option which you can tick if you wish. Other sections of the survey which contain sensitive items can be skipped if you wish too. You are also reminded that if at any point you should experience any discomfort or disadvantage as part of the research you are free to withdraw without giving a reason. If you are unhappy with any aspect of the study, please feel free to contact the researcher and we will try to help. The research team are not clinically trained and cannot provide therapeutic help or support for those in distress. There are contact details for UK support agencies in the participant debrief which we advise you to access if you feel like you may need additional support.

**Are there any benefits in taking part?**

There are no direct benefits in taking part in this study. However, the outcomes of the research may help mothers and families in the future.

**What will happen to the results of the study?**

The overall results of the study will be reported in a Doctorate in Clinical Psychology thesis and may be published in academic journals or presented at conferences. It will not be possible to identify individual participants.

**Expenses and / or payments**

You will not receive payment for participating in this study but will have the option to take part in a prize draw to win £100 in vouchers on completion of the questionnaire.

**What will happen if I want to stop taking part?**

You may withdraw your participation in the study at any time, without explanation. During the study you may withdraw by closing the questionnaire. As the survey is anonymous, data collected up to the point of withdrawal will still be used. Due to the information you provide being anonymised, you will also be unable to ask for access to, or to request the destruction of, that information once the questionnaire has been completed and submitted.

**What if I am unhappy or if there is a problem?**

If you are unhappy, or if there is a problem, please contact the researcher at the address below and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Ethics and Integrity Office at [ethics@liv.ac.uk](mailto:ethics@liv.ac.uk). When contacting the Research Ethics and Integrity Office, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

The University strives to maintain the highest standards of rigour in the processing of your data. However, if you have any concerns about the way in which the University processes your personal data, it is important that you are aware of your right to lodge a complaint with the Information Commissioner's Office by calling 0303 123 1113.

**Will my participation be kept confidential?**



All the information collected about you during the course of the research will be anonymous. The data collected in this study will be stored on a password protected computer and all data will remain confidential. Only the researcher, Kate Abbott, and her supervisory team will have access to the data. It will not be made publically available. The Data Controllers for the study is Dr Jo Harrold ([harrold@liverpool.ac.uk](mailto:harrold@liverpool.ac.uk)) and the University Data Protection Officer, Mrs Victoria Heath, can be contacted on 0151 794 2148.

**Who can I contact if I have further questions?**

Dr Joanne Harrold, Eleanor Rathbone Building, Bedford Street South, University of Liverpool, Liverpool, L69 7ZA,  
Email: [harrold@liv.ac.uk](mailto:harrold@liv.ac.uk)  
Tel: +44 (0)151 795 8513

## Appendix 5: Participant Consent Forms at Time 1 and Time 2



### Participant consent form

**Title of the research project: Infant feeding information in pregnancy and experiences after birth: Impact of maternal expectations, wellbeing and social media comparisons.**

Name of researcher(s): Joanne Harrold, Vicky Fallon, Kate Abbott – University of Liverpool

Please tick box

1. I confirm that I have read and have understood the information sheet dated August 2019 for the above study, or it has been read to me. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that taking part in the study involves completing online questionnaires at two time points: in my third trimester of pregnancy and when my baby is 6-14 weeks old. ☐
3. I understand that my participation is voluntary and that I am free to stop taking part and can withdraw from the study at any time without giving any reason and without my rights being affected. In addition, I understand that I am free to decline to answer any particular question or questions that are deemed sensitive. ☐
4. I understand that due to the information I provide being anonymised, I am unable to ask for access to this information or request the destruction of that information once it has been submitted. ☐
5. I understand that the information I provide will be held securely and in line with data protection requirements at the University of Liverpool for a minimum of 10 years. ☐
6. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my fully anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. ☐

1. I agree to being contacted when my baby has been born and invited to complete online questionnaires for the second and final phase of the study.
2. I agree to take part in the above study.

☐  
☐

**Principal Investigator**

Joanne Harrold  
Eleanor Rathbone Building  
Bedford Street South  
University of Liverpool  
Liverpool  
L69 7ZA  
Tel: +44 (0)151 795 8513  
Email: [harrold@liv.ac.uk](mailto:harrold@liv.ac.uk)

**Student Investigator**

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### Participant consent form

**Title of the research project: Infant feeding information in pregnancy and experiences after birth: Impact of maternal expectations, wellbeing and social media comparisons.**

Name of researcher(s): Joanne Harrold, Vicky Fallon, Kate Abbott – University of Liverpool

Please tick box

- |   |  |
|---|--|
| 1. I confirm that I have read and have understood the information sheet dated August 2019 for the above study, or it has been read to me. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.   | <input type="checkbox"/><br><input type="checkbox"/> |
| 2. I understand that I have been asked to take part in this part of the study because I previously took part when I was pregnant.   |  |
| 3. I understand that taking part in this second part of the study involves completing an online questionnaire now that my baby is 6-14 weeks old.   | <input type="checkbox"/>                             |
| 4. I understand that my participation is voluntary and that I am free to stop taking part and can withdraw from the study at any time without giving any reason and without my rights being affected. In addition, I understand that I am free to decline to answer any particular question or questions that are deemed sensitive. | <input type="checkbox"/>                             |
| 5. I understand that due to the information I provide being anonymised, I am unable to ask for access to this information or request the destruction of that information once it has been submitted.  | <input type="checkbox"/>                             |
| 6. I understand that the information I provide will be held securely and in line with data protection requirements at the University of Liverpool for a minimum of 10 years.  | <input type="checkbox"/>                             |
| 7. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my fully anonymised responses. I understand that my name will not be linked with the   | <input type="checkbox"/>                             |

1. research materials, and I will not be identified or identifiable in the report or reports that result from the research.
2. I agree to take part in the above study.



**Principal Investigator**

Joanne Harrold  
Eleanor Rathbone Building  
Bedford Street South  
University of Liverpool  
Liverpool  
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## Appendix 6: Demographic Questions in the Survey at Time Points 1 and 2

### Time 1 Demographics

1. Are you planning to reside in the UK until your baby is at least 4 months old?  
[if no, screen out, redirected to debrief]
2. How many weeks pregnant are you? [if <28, screen out, redirected to debrief]
3. Is this your first baby? [if no, screen out, redirected to debrief]
4. Are you pregnant with a single baby (not multiples)? [if no, screen out, redirected to debrief]
5. What is your age? [Under 18s screened out, redirected to debrief]

6. Have you thought about how you will feed your baby?
  - Exclusive bottle feeding [screen out, redirected to debrief]
  - Exclusive breastfeeding\*
  - Mixed feeding (a combination of formula and breast milk)
  - Undecided

\* By breastfeeding we mean any method of feeding your baby breast milk

7. How long do you plan on exclusively breastfeeding your baby? (in weeks)
8. How long do you plan on giving your baby ANY breastmilk? (in weeks)

\* By breastfeeding we mean any method of feeding your baby breast milk.

9. Which NHS Trust is providing your antenatal care? [drop down menu]
10. What is your marital status?
  - Married
  - Single
  - Widowed
  - Divorced
  - Separated
  - Cohabiting (Living with partner)
  - Partner living elsewhere
  - Other
11. What is your highest qualification?
  - None

- GCSEs or equivalent
  - A-levels or equivalent
  - Undergraduate degree
  - Postgraduate degree
  - Higher than postgraduate degree
12. What is your current employment status?
- Full-time employment → **Next question triggered**
  - Part-time employment → **Next question triggered**
  - Full-time education and part-time work → **Next question triggered**
  - Self-employed
  - Full-time education or training scheme
  - Part-time education or training scheme
  - Unemployed
  - Home-maker
  - Voluntary work
  - On sick leave or disability
  - Retired
13. Please select the description that best fits your current job role
- Higher managerial, administrative and professional occupations
  - Lower managerial, administrative and professional occupations
  - Intermediate occupations
  - Small employers and own account workers
  - Lower supervisory and technical occupations
  - Semi-routine occupations
  - Routine occupations
14. Please specify your ethnicity.
- White
  - Bangladeshi
  - Black African
  - Black Caribbean
  - Chinese
  - Greek/Greek Cypriot
  - Indian
  - Irish
  - Other Black
  - Pakistani
  - Turkish/Turkish Cypriot

- Other
- Prefer not to say

15. What is your approximate FAMILY income?

- Up to £10,000
- £10,000 - £20,000
- £21,000 - £30,000
- £31,000 - £40,000
- £41,000 - £50,000
- £51,000 - £60,000
- £61,000 - £70,000
- Over £71,000
- Don't know

16. How many people live in your household with you?

- Adults over the age of 18
- Children and young people under the age of 18

17. Is the place where you live owned or rented by you?

- Owner occupied
- Rented from private landlord
- Rented from council or housing association
- Accommodation provided by work – pay rent
- Accommodation provided by work – no rent
- Guest in someone else's home
- Other (please describe)



## **Time 2 Demographics**

1. How many weeks into your pregnancy were you when your baby was delivered?
  - Before 37 weeks [screen out, redirected to debrief]
  - 38
  - 39
  - 40
  - 41
  - 42
2. Did your baby spend any time in the Special Care Baby Unit (SCBU), Newborn Intensive care Unit (NICU) or anywhere other than with you following delivery?
  - Yes [drop down the next question]
  - No
3. How long were you separated from your baby following delivery?
  - Less than one hour
  - Up to 6 hours
  - Up to 12 hours
  - Up to 24 hours
  - Up to 48 hours [screen out, redirected to debrief]
  - Longer than 2 days [screen out, redirected to debrief]
4. How was your baby delivered?
  - Unassisted Vaginal Delivery.
  - Vacuum (ventouse) Extraction.
  - Forceps Delivery.
  - Elective Caesarian Section (C-Section).
  - Emergency Caesarian Section (C-Section)
5. How old is your baby now (in weeks)?
6. What is the sex of your baby?
  - Male
  - Female

7. How are you currently feeding your baby?

- Exclusively formula feeding
- Exclusively breastfeeding
- Mixed feeding (a combination of formula and breast milk)\*

\* By breastfeeding we mean any method of feeding your baby breast milk

**[For mothers who are not currently breastfeeding]**

8. Have you ever breastfed your baby? Yes/No

9. For how long did you exclusively breastfeed your baby? (weeks)

10. For how long did you give your baby ANY breast milk? (weeks)

## **Appendix 7: Debrief Time Point 1**

### **Infant feeding information in pregnancy and feeding experiences after birth: Impact of maternal expectations, wellbeing and social media comparisons**

#### **Debrief**

*Thank you for participating in the first part of this study.*

#### **What is the purpose of the study?**

The purpose of the study is to explore the information that first time mothers receive about infant feeding. We are interested in finding out how well prepared and supported mothers feel to make informed decisions about infant feeding and how the information received equips and supports mothers to prepare for infant feeding. The study also aims to explore how new and expectant mothers use social media and how comparing ourselves to others on social media may affect wellbeing and infant feeding experiences.

We hope that your continued participation in this research will help us to better understand these relationships in order to inform and improve the support that new and expectant mothers receive in the future.

#### **What if I want advice or support about infant feeding or maternal mental health?**

We are not qualified to offer advice ourselves. If you have questions or you have concerns about infant feeding or pre and postnatal mental health we advise you to seek information and advice from your GP, midwife or health visitor. As well as this, there are a number of support networks and information sources available:

#### ***Antenatal mental health related support and information***

- <https://www.mind.org.uk/information-support/types-of-mental-health-problems/postnatal-depression-and-perinatal-mental-health/postnatal-and-antenatal-depression/#.XK8wqfZFyUk>
- <https://www.nhs.uk/conditions/pregnancy-and-baby/mental-health-problems-pregnant/>

#### ***Feeding related support and information***

- Breastfeeding advice:
- <http://www.nhs.uk/conditions/pregnancy-and-baby/pages/breastfeeding-help-support.aspx>
- <https://www.unicef.org.uk/babyfriendly/>

- Bottle feeding advice:
- <http://www.nhs.uk/Conditions/pregnancy-and-baby/Pages/bottle-feeding-advice.aspx#close>
- <https://www.unicef.org/babyfriendly/baby-friendly-resources/leaflets-and-posters/simple-formula-guide-for-parents/>

**Who can I contact if I have further questions?**

If you have any questions then please contact the principal investigator:

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Tel: +44 (0)151 795 8513

## Appendix 8: Debrief Time Point 2

### **Antenatal infant feeding information and postnatal feeding experiences: Expectation versus reality, maternal mental health and self-comparison on social media.**

#### **Debrief**

*Thank you for participating in this study*

#### **What was the study about?**

The study had two aims. The first was to understand more about the relationship between mothers' infant feeding plans, expectations and experiences and the antenatal information received during the 28-week midwife feeding discussion. Specifically, the focus was to determine:

- i) whether mothers felt able to make informed decisions about how to feed their baby
- ii) how well the information they received equipped and supported them to prepare for this.

A second aim was to explore how new and expectant mothers use social media. Specifically, how the process of comparing themselves to others on social media might affect wellbeing and infant feeding experiences.

Previous research has shown that the majority of first time mothers do not meet their own exclusive breastfeeding goals. However, there is still a lot to be learned about why this is. Areas we need to know more about include how a mismatch between feeding goal and outcome relates to antenatal feeding information quality, feeding expectations, maternal mental health and social media social comparison. This survey allows us to gain a better understanding of how mothers feel about the infant feeding information they receive and how they believe this relates to their own infant feeding expectations in pregnancy and feeding reality once their baby arrives. It will also help us in our understanding of how mothers seek out feeding information and support on social media and how social comparison during this important time might affect mental wellbeing.

#### **What if I want advice or support about infant feeding or postnatal mental health?**

We are not qualified to offer advice ourselves. If you have questions or you have concerns about infant feeding or pre and postnatal mental health we advise you to seek information and advice from your GP, midwife or health visitor. As well as this, there are a number of support networks and information sources available:

#### ***Feeding related support and information***

- Breastfeeding advice:
  - <http://www.nhs.uk/conditions/pregnancy-and-baby/pages/breastfeeding-help-support.aspx>
  - <https://www.unicef.org.uk/babyfriendly/>
- Bottle feeding advice:
  - <http://www.nhs.uk/Conditions/pregnancy-and-baby/Pages/bottle-feeding-advice.aspx#close>

- <https://www.unicef.org.uk/babyfriendly/baby-friendly-resources/leaflets-and-posters/simple-formula-guide-for-parents/>

### **Mental health related support and information**

- National Health Service: <http://www.nhs.uk/conditions/postnataldepression/pages/introduction.aspx>
- Mind: [http://www.mind.org.uk/information-support/types-of-mental-health-problems/postnatal-depression/symptoms-and-causes/?o=9113#.VOdKc\\_msWSo](http://www.mind.org.uk/information-support/types-of-mental-health-problems/postnatal-depression/symptoms-and-causes/?o=9113#.VOdKc_msWSo)
- Association for Postnatal Illness: <http://www.apni.org/>
- Postpartum Depression Ireland: <http://www.pnd.ie/index.html>
- Parenting across Scotland: <http://www.parentingacrossscotland.org/about-us.aspx>
- Postpartum Support International: <http://postpartum.net/>
- Postpartum Progress: <http://www.postpartumprogress.com/>
- Still birth and neonatal death: <https://www.sands.org.uk/>

### **Who can I contact if I have further questions?**

If you have any questions then please contact the principal investigator:

Dr Joanne Harrold, Eleanor Rathbone Building, Bedford Street South, University of Liverpool, Liverpool, L69 7ZA,

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## **Appendix 9: Feeding Intention and Feeding Method**

### **TIME POINT 1**

Have you thought about how you will feed your baby?

- Exclusive bottle feeding
- Exclusive breastfeeding (by breastfeeding we mean any method of feeding your baby breastmilk)
- Mixed feeding
- Undecided

How long do you plan on exclusively breastfeeding your baby? (in weeks)  
[Options for 0-52 then “More than one year”]

How long do you plan on giving your baby ANY breastmilk? (in weeks)  
[Options 1-52 then “More than one year”]

### **TIME POINT 2**

How are you currently feeding your baby?

- Exclusively formula feeding
- Exclusively breastfeeding (by breastfeeding we mean any means of feeding your baby breast milk)
- Mixed feeding
  - If Exclusively formula feeding is selected:

Have you ever breastfed your baby?

- Yes
- No

○ If Yes is selected:

For how long did you exclusively breastfeed your baby? (weeks)

For how long did you give your baby ANY breast milk? (weeks)

## Appendix 10: Breastfeeding expectations/reality

We are interested in the information that first time mothers receive about infant feeding. In the UK, midwives generally offer information and talk with expectant mothers about how they plan to feed their baby during an antenatal appointment in their third trimester.

How many weeks pregnant were you when you had the discussion about how you plan to feed your baby with your midwife. [drop down to select week of pregnancy]

**Keeping this midwife appointment in mind:**

**I feel the information I received from my midwife about feeding my baby:**

1. Provided me with information about breastfeeding
  - I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
2. Provided me with information about formula feeding
  - I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
3. Provided me with information about what will happen after my baby is born
  - I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
4. Has allowed me to make an informed decision about my feeding intention
  - I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
5. Has allowed me to feel prepared about feeding my baby
  - I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
6. Has allowed me to feel prepared about formula feeding my baby
  - I agree strongly



- I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
7. Has allowed me to feel confident about breastfeeding my baby
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
8. Has allowed me to feel confident about formula feeding my baby
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
9. Has informed me of what breastfeeding support is available to me after the birth of my baby
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
10. Has informed me of what formula feeding support is available to me after the birth of my baby
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
11. I felt my midwife gave me the right amount of practical information about breastfeeding my baby in terms of how to do it
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
12. I felt my midwife gave me the right amount of practical information about formula feeding my baby in terms of how to do it
- I agree strongly
  - I agree
  - Neither agree nor disagree

- I disagree
- I disagree strongly

13. I felt my midwife gave me the right amount of practical information about breastfeeding my baby in terms of equipment I might need

- I agree strongly
- I agree
- Neither agree nor disagree
- I disagree
- I disagree strongly

14. I felt my midwife gave me the right amount of practical information about formula feeding my baby in terms of equipment I might need

- I agree strongly
- I agree
- Neither agree nor disagree
- I disagree
- I disagree strongly

15. I felt my midwife gave me the right amount of practical information about breastfeeding my baby in terms of possible challenges I might face

- I agree strongly
- I agree
- Neither agree nor disagree
- I disagree
- I disagree strongly

16. I felt my midwife gave me the right amount of practical information about formula feeding my baby in terms of possible challenges I might face

- I agree strongly
- I agree
- Neither agree nor disagree
- I disagree
- I disagree strongly

17. I felt my midwife gave me the right amount of practical information about breastfeeding my baby in terms of where to find support

- I agree strongly
- I agree
- Neither agree nor disagree
- I disagree
- I disagree strongly

18. I felt my midwife gave me the right amount of practical information about formula feeding my baby in terms of where to find support

I agree strongly

- I agree
- Neither agree nor disagree

- I disagree
  - I disagree strongly
19. I felt that my views on infant feeding and plans about how to feed my baby were respected
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
20. I felt that I was asked the right amount of questions about my feeding choices
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
21. I felt the information I received from my midwife about breastfeeding was realistic
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly
22. I felt the information I received from my midwife about formula feeding was realistic
- I agree strongly
  - I agree
  - Neither agree nor disagree
  - I disagree
  - I disagree strongly

## Appendix 11: Edinburgh Postnatal Depression Scale (EPDS)

**Now we would like to ask you some questions about how you have been feeling.**

*Please circle the answer which comes closest to how you have felt **IN THE PAST WEEK**, not just how you feel today.*

*In the past seven days:*

1	<b>I have been able to laugh and see the funny side of things</b>	As much as I always could	Not quite so much now	Definitely not so much now	Not at all
2	<b>I have looked with enjoyment to things</b>	As much as I ever did	Rather less than I used to	Definitely less than I used to	Hardly at all
3	<b>I have blamed myself unnecessarily when things went wrong</b>	Yes, most of the time	Yes, some of the time	Not very often	No, never
4	<b>I have been anxious and worried for no good reason</b>	No, not at all	Hardly ever	Yes, sometimes	Yes, very often
5	<b>I have felt scared or panicky for no very good reason</b>	Yes, quite a lot	Yes, sometimes	No, not so much	No, not at all
6	<b>Things have been getting on top of me</b>	Yes, most of the time I haven't been able to cope at all	Yes, sometimes I haven't been coping as well as usual	No, most of the time I have coped quite well	No, I have been coping as well as ever
7	<b>I have been so unhappy that I have had difficulty sleeping</b>	Yes, most of the time	Yes, sometimes	Not very often	No, not at all
8	<b>I have felt sad and miserable</b>	Yes, most of the time	Yes, quite often	Not very often	No, not at all
9	<b>I have been so unhappy that I have been crying</b>	Yes, most of the time	Yes, quite often	Only occasionally	No, never
The following question relates to thoughts and feelings and not actions.					
10	<b>I have thought of harming myself</b>	Yes, quite often	Sometimes	Hardly ever	Never

## Appendix 12: Generalised Anxiety Disorder Assessment (GAD-7)

**Over the last 2 weeks, how often has you been bothered by the following problems?**

1. **Feeling nervous, anxious or on edge**  
Not at all  
Several days  
Over half the days  
Nearly every day
2. **Not being able to stop of control worrying**  
Not at all  
Several days  
Over half the days  
Nearly every day
3. **Worrying too much about different things**  
Not at all  
Several days  
Over half the days  
Nearly every day
4. **Trouble relaxing**  
Not at all  
Several days  
Over half the days  
Nearly every day
5. **Being so restless that it's hard to sit still**  
Not at all  
Several days  
Over half the days  
Nearly every day
6. **Becoming easily annoyed or irritable**  
Not at all  
Several days  
Over half the days  
Nearly every day
7. **Feeling afraid as if something awful might happen**  
Not at all  
Several days  
Over half the days  
Nearly every day

## Appendix 13: Social Comparison (Iowa-Netherlands Comparison Orientation Scale, INCOM)

We are interested in how people compare themselves to others.  
*Please indicate how much you agree with each statement below.*

1. I often compare myself with others with respect to what I have accomplished in life
  - I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
2. If I want to learn more about something, I try to find out what others think about it
  - I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
3. I always pay a lot of attention to how I do things compared with how others do things
  - I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
4. I often compare how my loved ones (boy or girlfriend, family members, etc.) are doing with how others are doing
  - I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
5. I always like to know what others in a similar situation would do
  - I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
6. I am not the type of person who compares often with others
  - I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
7. If I want to find out how well I have done something, I compare what I have done with how others have done
  - I disagree strongly

- I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
8. I often try to find out what others think who face similar problems as I face
- I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
9. I often like to talk with others about mutual opinions and experiences
- I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
10. I never consider my situation in life relative to that of other people
- I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
11. I often compare how I am doing socially (e.g., social skills, popularity) with other people
- I disagree strongly
  - I disagree
  - I neither agree nor disagree
  - I agree
  - I agree strongly
12. How often do you compare yourself with others who are performing worse than you are?
- Never
  - Seldom
  - Sometimes
  - Regularly
  - Often
13. How often do you compare yourself with others who are performing better than you are?
- Never
  - Seldom
  - Sometimes
  - Regularly
  - Often

## Appendix 14: Social media use

The following questions ask about your use of social media. For each statement please select a response that best reflects how often you have accessed each internet site.

Over the last 6 weeks I have used the internet to:							
	Several times a day	Once a day	Several times a week	Once a week	Less than once a week	Never	Prefer not to say
Use Twitter							
Use Instagram							
Use Pinterest							
Use Mumsnet							
Use Emma's Diary							
Use other parenting websites							
Use Facebook							



People engage with social media internet sites in different ways.  
In which of the following ways do you engage with:

Please tick all that apply		
<b>Twitter</b>	<ul style="list-style-type: none"> <li>• View content</li> <li>• Share/Post →</li> <li>• Comment →</li> </ul>	<ul style="list-style-type: none"> <li>• Frequently</li> <li>• Sometimes</li> <li>• Hardly ever</li> <li>• Prefer not to say</li> </ul>
<b>Instagram</b>	<ul style="list-style-type: none"> <li>• View content</li> <li>• Share/Post →</li> <li>• Comment →</li> </ul>	<ul style="list-style-type: none"> <li>• Frequently</li> <li>• Sometimes</li> <li>• Hardly ever</li> <li>• Prefer not to say</li> </ul>
<b>Pinterest</b>	<ul style="list-style-type: none"> <li>• View content</li> <li>• Share/Post →</li> <li>• Comment →</li> </ul>	<ul style="list-style-type: none"> <li>• Frequently</li> <li>• Sometimes</li> <li>• Hardly ever</li> <li>• Prefer not to say</li> </ul>
<b>Mumsnet</b>	<ul style="list-style-type: none"> <li>• View content</li> <li>• Share/Post →</li> <li>• Comment →</li> </ul>	<ul style="list-style-type: none"> <li>• Frequently</li> <li>• Sometimes</li> <li>• Hardly ever</li> <li>• Prefer not to say</li> </ul>
<b>Emma's Diary</b>	<ul style="list-style-type: none"> <li>• View content</li> <li>• Share/Post →</li> <li>• Comment →</li> </ul>	<ul style="list-style-type: none"> <li>• Frequently</li> <li>• Sometimes</li> <li>• Hardly ever</li> <li>• Prefer not to say</li> </ul>
<b>Other parenting websites</b>	<ul style="list-style-type: none"> <li>• View content</li> <li>• Share/Post →</li> <li>• Comment →</li> </ul>	<ul style="list-style-type: none"> <li>• Frequently</li> <li>• Sometimes</li> <li>• Hardly ever</li> <li>• Prefer not to say</li> </ul>
<b>Facebook</b>	<ul style="list-style-type: none"> <li>• View content</li> <li>• Share/Post →</li> <li>• Comment →</li> </ul>	<ul style="list-style-type: none"> <li>• Frequently</li> <li>• Sometimes</li> <li>• Hardly ever</li> <li>• Prefer not to say</li> </ul>

## Appendix 15: Sample Distributions by Demographic Factors

### *Time 1 Sample Distribution by Demographic Factors*

Indicator	Mean (SD)	Group	N	%
Age	29.51 (4.87)	≤ 19	4	2.3
		20-24	26	15.1
		25-29	46	26.7
		30-34	68	39.5
		≥ 35	28	16.3
Gestation (weeks)	34.48 (3.39)	28-32	48	27.9
		33-36	69	40.1
		37-40	54	31.4
		>40	1	0.6
Feeding Intention		Exclusive breastfeeding	151	87.8
		Mixed feeding	21	12.2
Ethnicity		White	164	95.3
		Black Caribbean	1	0.6
		Greek/Greek Cypriot	1	0.6
		Indian	1	0.6
		Irish	1	0.6
		Pakistani	2	1.2
		Turkish/Turkish Cypriot	1	0.6
		Other	1	0.6
Education		GCSEs or equivalent	9	5.2
		A-levels or equivalent	32	18.6
		Undergraduate degree	78	45.3
		Postgraduate degree	48	27.9
		Higher than postgraduate degree	5	2.9
Marital Status		Married	89	51.7
		Single	13	7.6
		Cohabiting	69	40.1
		Partner living elsewhere	1	0.6

Indicator	Mean (SD)	Group	N	%
Employment Status		Full-time employment	141	82.0
		Part-time employment	12	7.0
		Full-time education and part-time work	2	1.2
		Self-employed	6	3.5
		Full-time education or training	2	1.2
		Part-time education or training	1	0.6
		Unemployed	6	3.5
		Home-maker	2	1.2
Occupation		Managers, directors and senior officials	23	14.8
		Professional occupations	81	52.3
		Associate professional/technical occupations	4	2.6
		Administrative and secretarial occupations	14	9.0
		Skilled trades and occupations	1	0.6
		Caring, leisure and other service occupations	11	7.1
		Sales and customer service occupations	19	12.3
		Elementary occupations	2	1.3

*Time 2 Sample Distribution by Demographic Factors*

Indicator	Mean (SD)	Group	N	%
Maternal age	29.65 (4.82)	≤ 19	2	1.7
		20-24	18	15.1
		25-29	30	25.2
		30-34	51	42.9
		≥ 35	18	15.1
Gestation at delivery	39.8 (1.19)	38-40	85	71.4
		>40	34	28.6
Baby age (weeks)	9.11 (1.97)	6-10	92	77.3
		11-15	27	22.7
Feeding Method		Exclusive breastfeeding	65	54.6
		Mixed feeding	20	10.1
		Exclusive formula feeding	34	28.6
BIBG		Yes	51	42.9
		No	68	57.1
Ethnicity		White	114	95.8
		Indian	1	0.8
		Irish	1	0.8
		Pakistani	1	0.8
		Turkish/Turkish Cypriot	1	0.8
		Other	1	0.8
Education		GCSEs or equivalent	4	3.4
		A-levels or equivalent	18	15.1
		Undergraduate degree	56	47.1
		Postgraduate degree	38	31.9
		Higher than postgraduate degree	3	2.5
Marital Status		Married	65	54.6
		Single	9	7.6
		Cohabiting	44	37.0
		Partner living elsewhere	1	0.8

Employment	Full-time employment	102	85.7
Status	Part-time employment	8	6.7
	Full-time education and part-time work	-	-
	Self-employed	3	2.5
	Full-time education or training	1	0.8
	Part-time education or training	-	-
	Unemployed	4	3.4
	Home-maker	1	0.8
Occupation	Managers, directors and senior officials	15	13.6
	Professional occupations	63	57.3
	Associate professional/technical occupations	3	2.7
	Administrative and secretarial occupations	5	4.5
	Skilled trades and occupations	1	0.9
	Caring, leisure and other service occupations	9	8.2
	Sales and customer service occupations	14	12.7
	Elementary occupations	-	-

## Appendix 16: Participant Flow Diagram

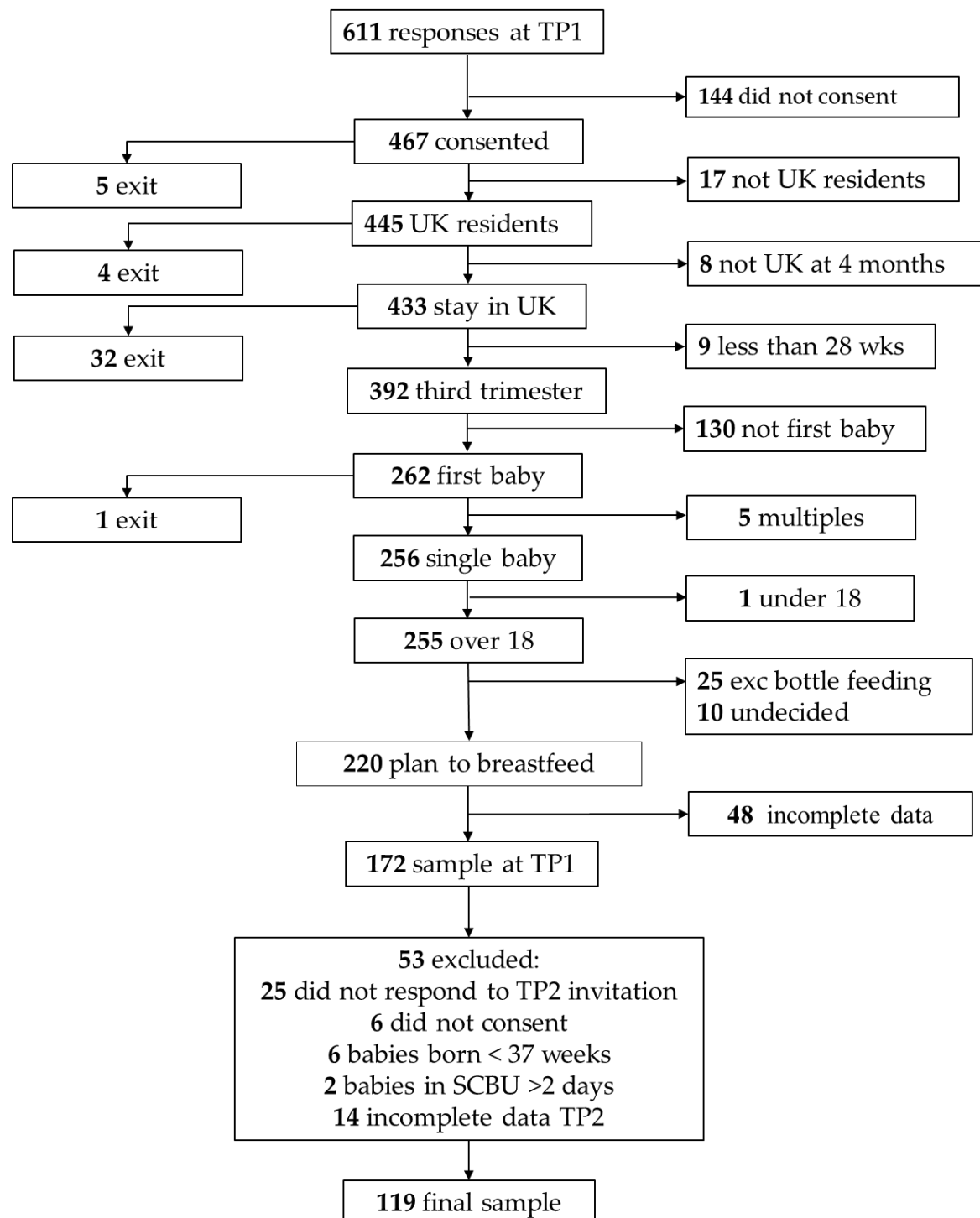


Figure 1. Participant Flow Diagram

## Appendix 17 – Skewness and Kurtosis Data and Histograms of Raw and Transformed Variables

### *Variable Distribution Properties and Pre- and Post-Transformations*

Variable	Raw scores		Transformed scores	
	Skewness	Kurtosis	Skewness	Kurtosis
	(SE)	(SE)	(SE)	(SE)
T1 GAD-7 scores	1.154	1.361	-0.148	-0.357
sqrt(variable)	(.158)	(.314)	(.222)	(.440)
T1 EPDS scores	0.892	0.478	-0.153	-0.061
sqrt(variable)	(.158)	(.314)	(.222)	(.440)
T1 Social Comparison scores	-0.543	-0.164	-0.723	-0.037
sqrt(variable)	(.158)	(.314)	(.222)	(.440)
T2 GAD-7 scores	1.048	.528	-0.116	-0.588
sqrt(variable)	(.158)	(.314)	(.222)	(.440)
T2 EPDS score	0.729	0.410	-0.405	0.058
sqrt(variable)	(.158)	(.314)	(.222)	(.440)
T2 Social Comparison scores	-0.317	-0.280	-0.565	0.173
sqrt(variable)	(.158)	(.314)	(.222)	(.440)

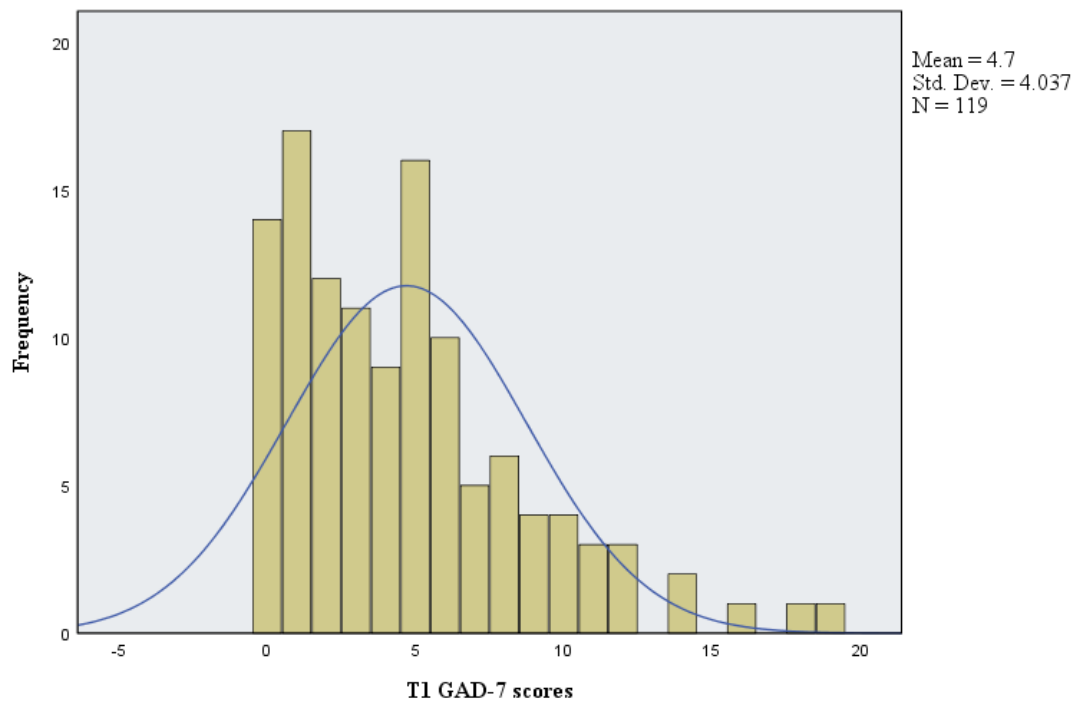


Figure 2a. Distribution of Time 1 GAD-7 scores

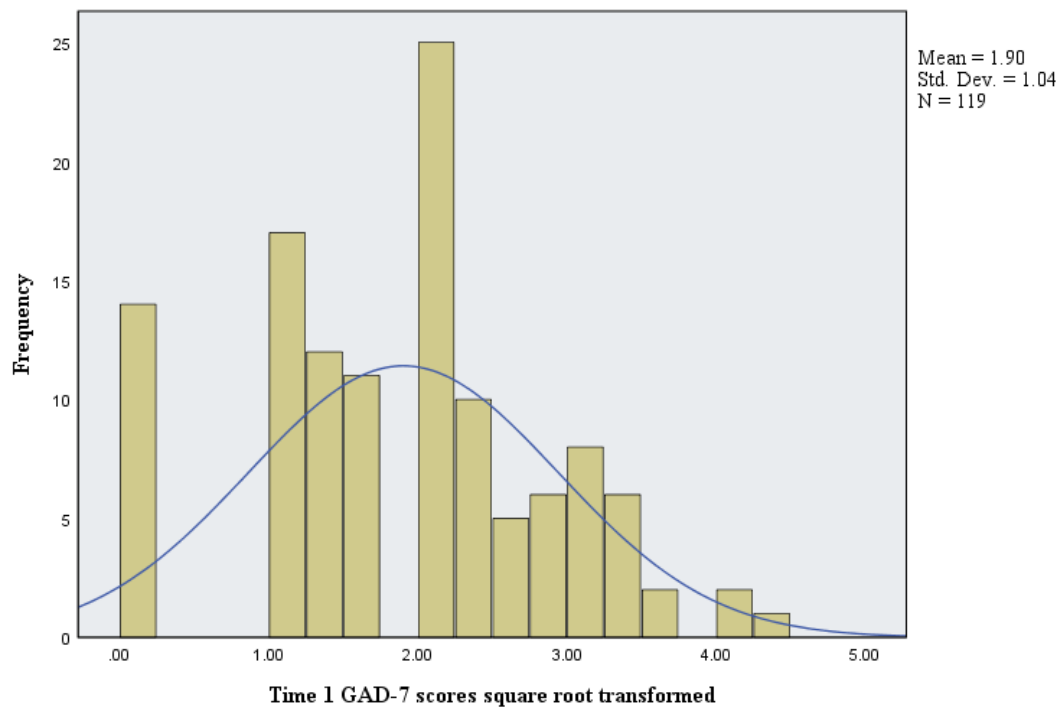


Figure 2b. Distribution of Time 1 GAD-7 scores square root transformed



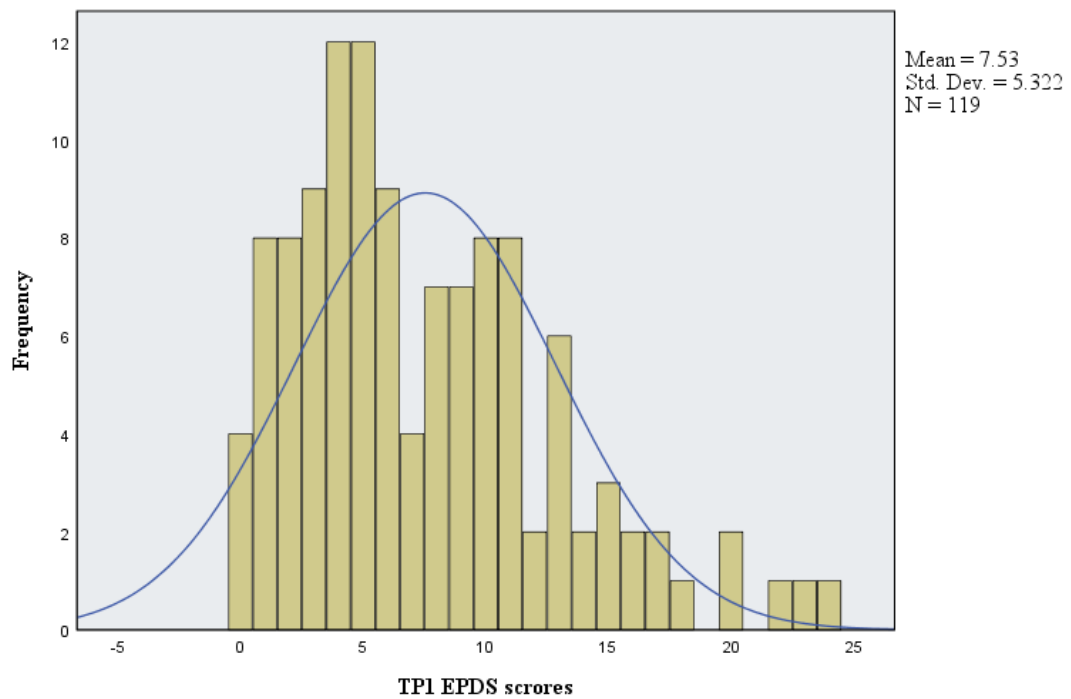


Figure 3a. Distribution of Time 1 EPDS scores

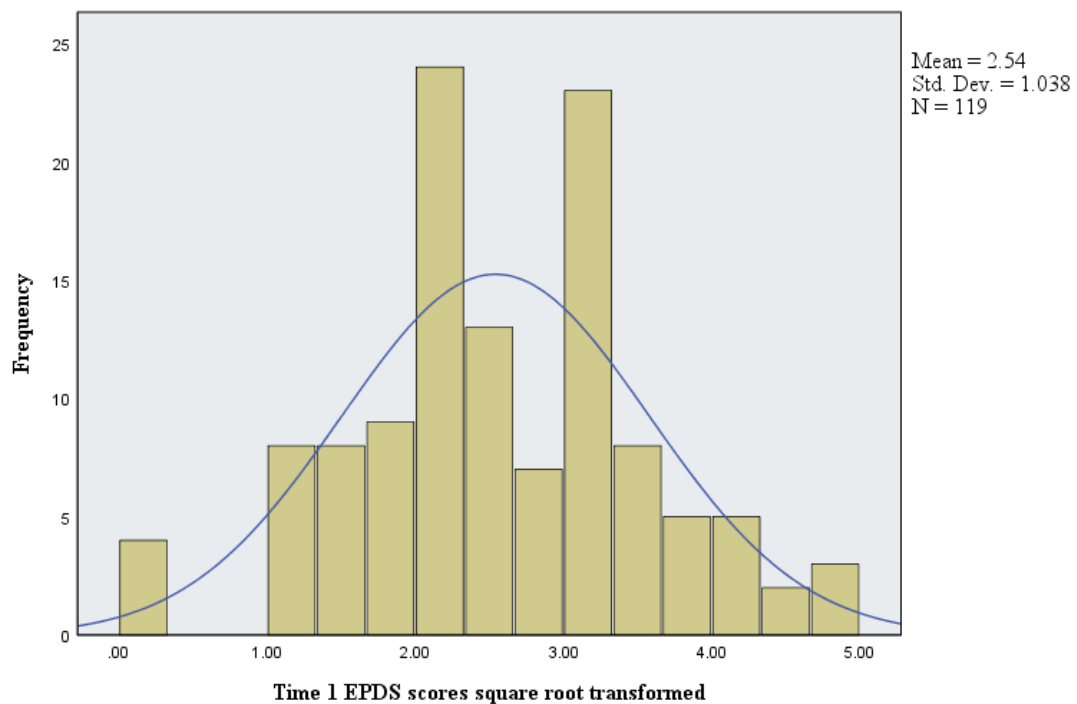


Figure 3b. Distribution of Time 1 EPDS scores square root transformed

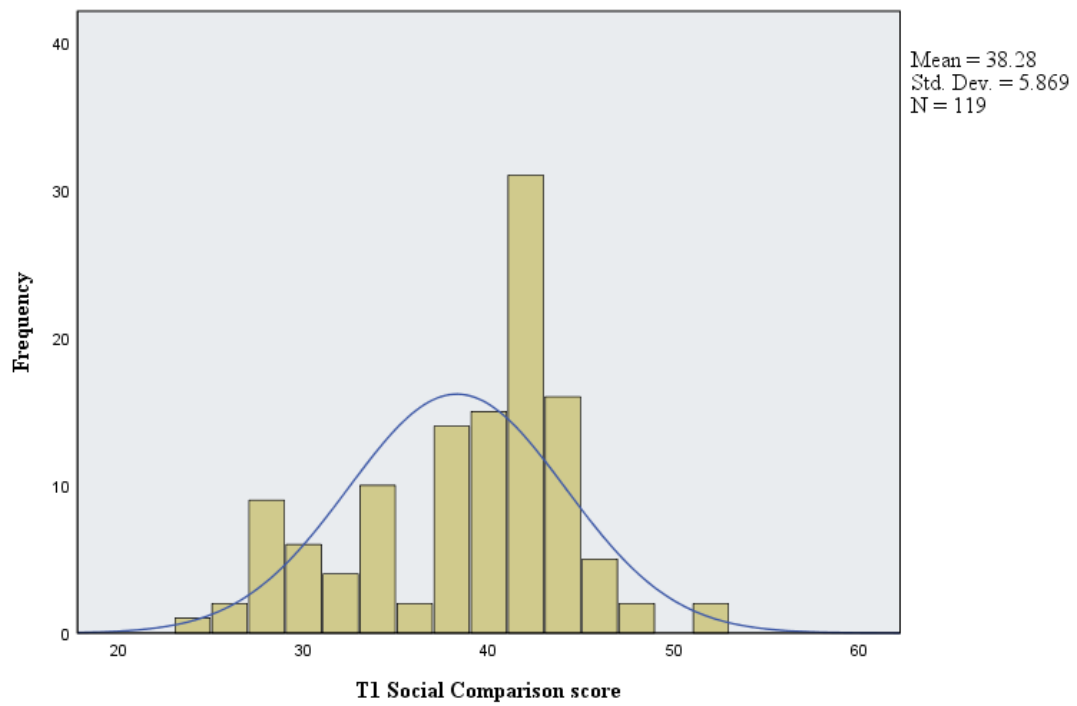


Figure 4a. Distribution of Time 1 Social Comparison scores

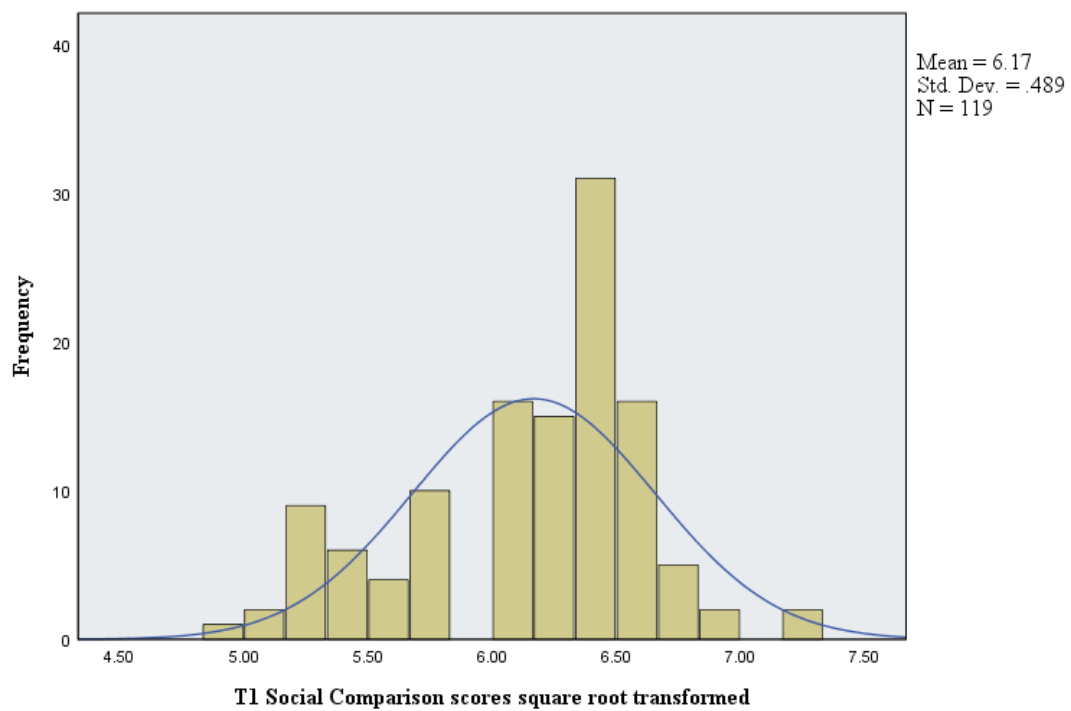


Figure 4b. Distribution of Time 1 Social Comparison scores square root transformed

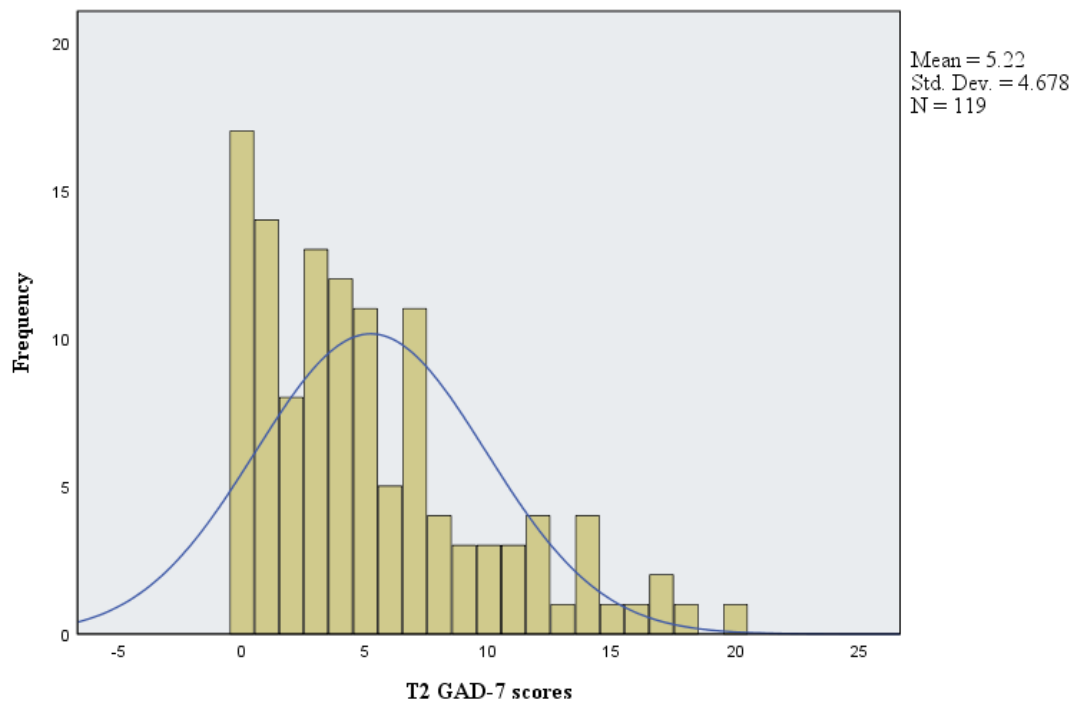


Figure 5a. Distribution of Time 2 GAD-7 scores

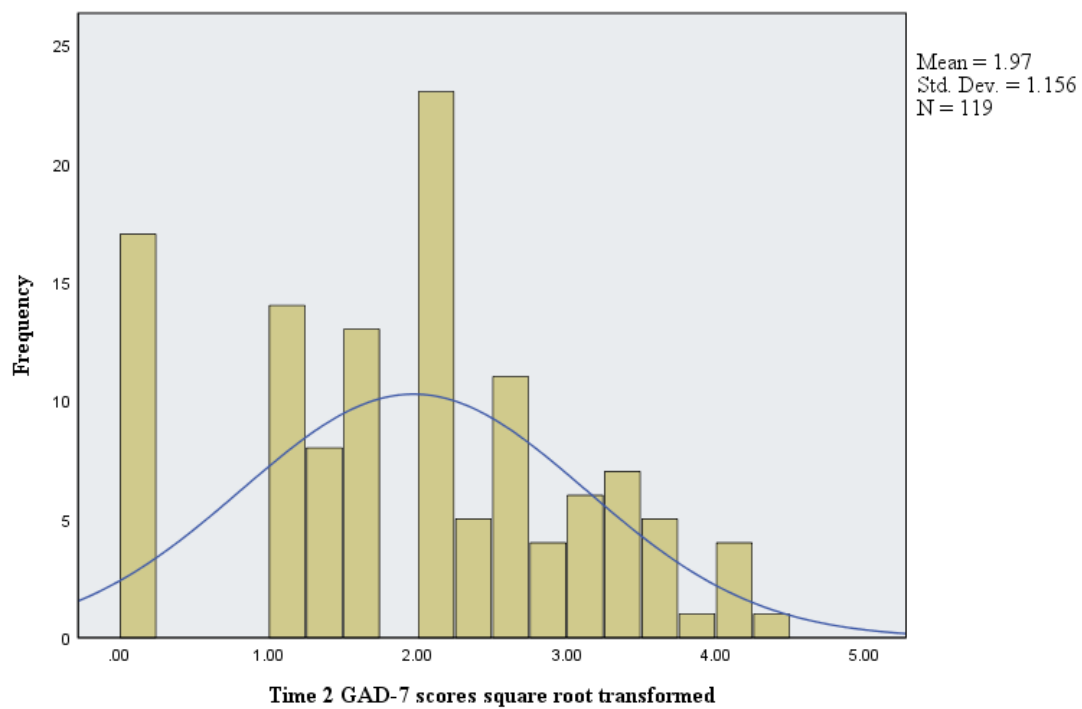


Figure 5b. Distribution of Time 2 GAD-7 scores square root transformed

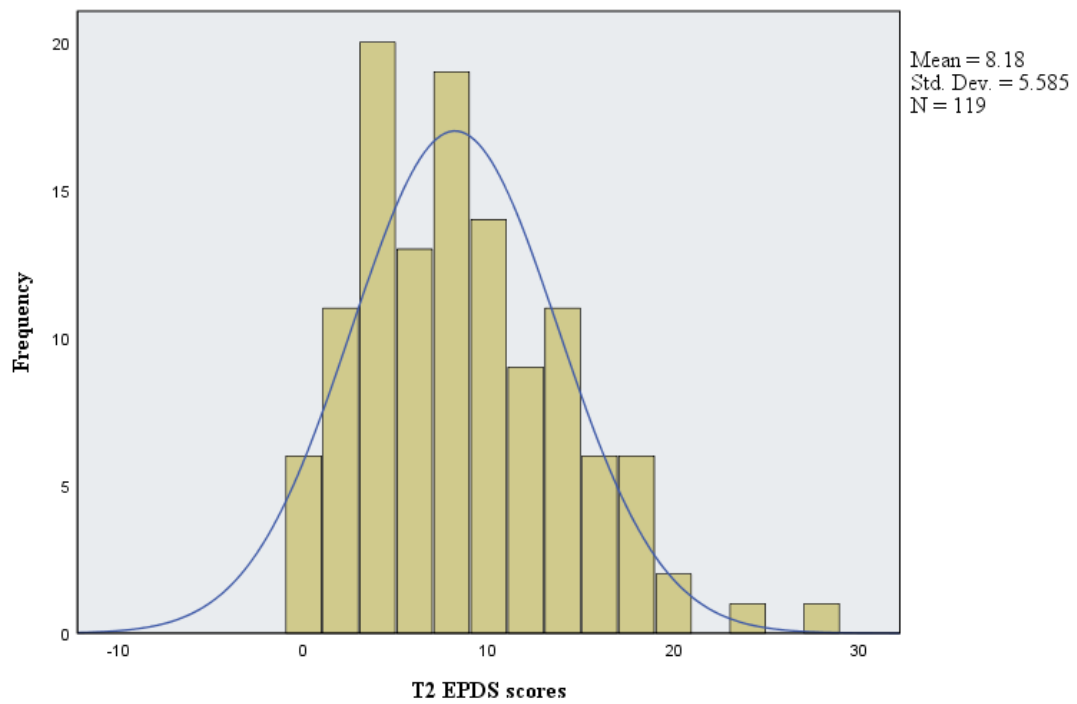


Figure 6a. Distribution of Time 2 EPDS scores

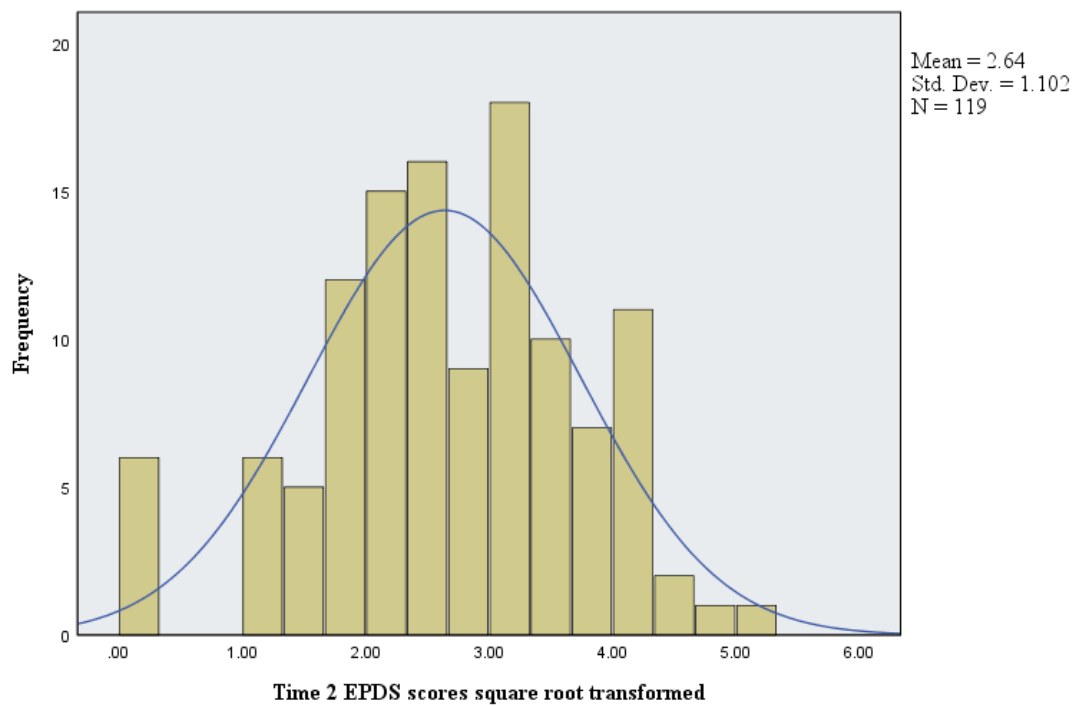


Figure 6b. Distribution of Time 2 EPDS scores square root transformed

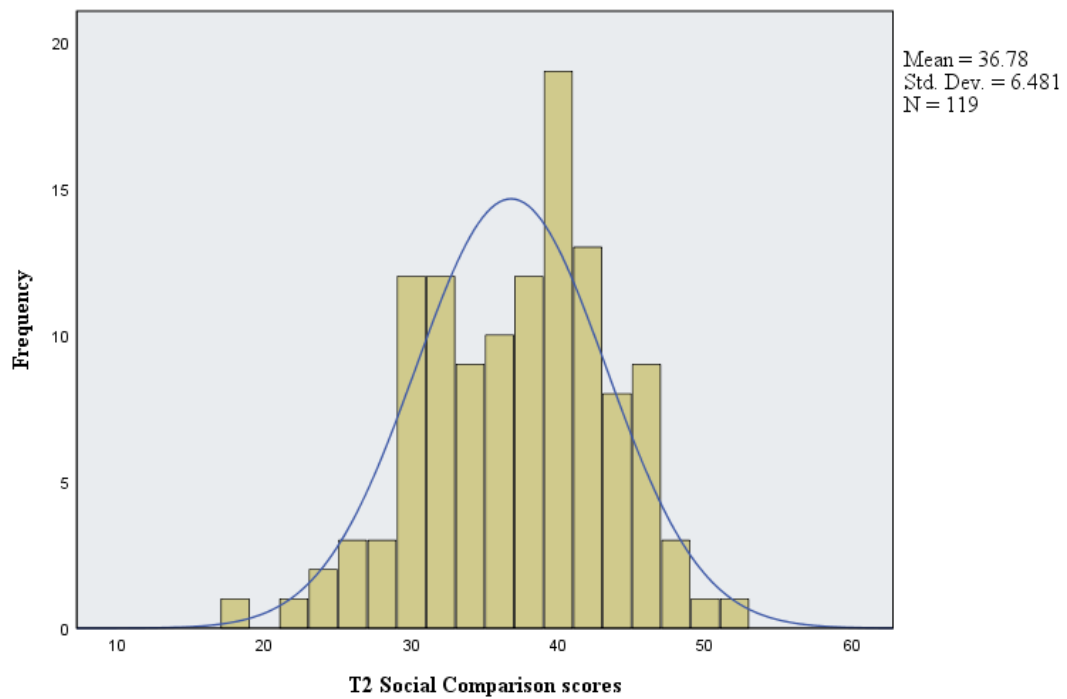


Figure 7a. Distribution of Time 2 Social Comparison scores

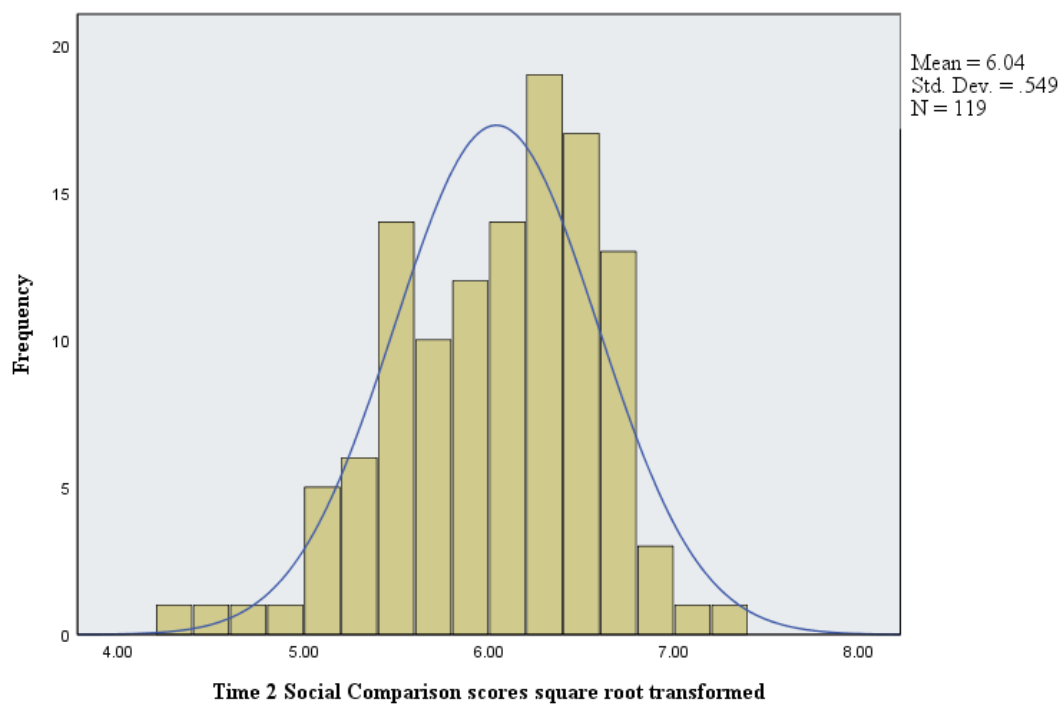


Figure 7b. Distribution of Time 2 Social Comparison scores square root transformed

**Skewness and kurtosis data and histograms of raw variables for those that were normally distributed**

Table 1

*Distribution Properties for Normally Distributed Variables*

Variable	Raw scores	
	Skewness (SE)	Kurtosis (SE)
BFI expectation-reality difference scores	-0.134 (.222)	0.264 (.440)
Social Media Use Total Time 1 and 2	0.113 (.222)	0.194 (.440)
Maternal age	-0.048 (.222)	-0.092 (.440)
Maternal education level	-0.381 (.222)	0.156 (.440)

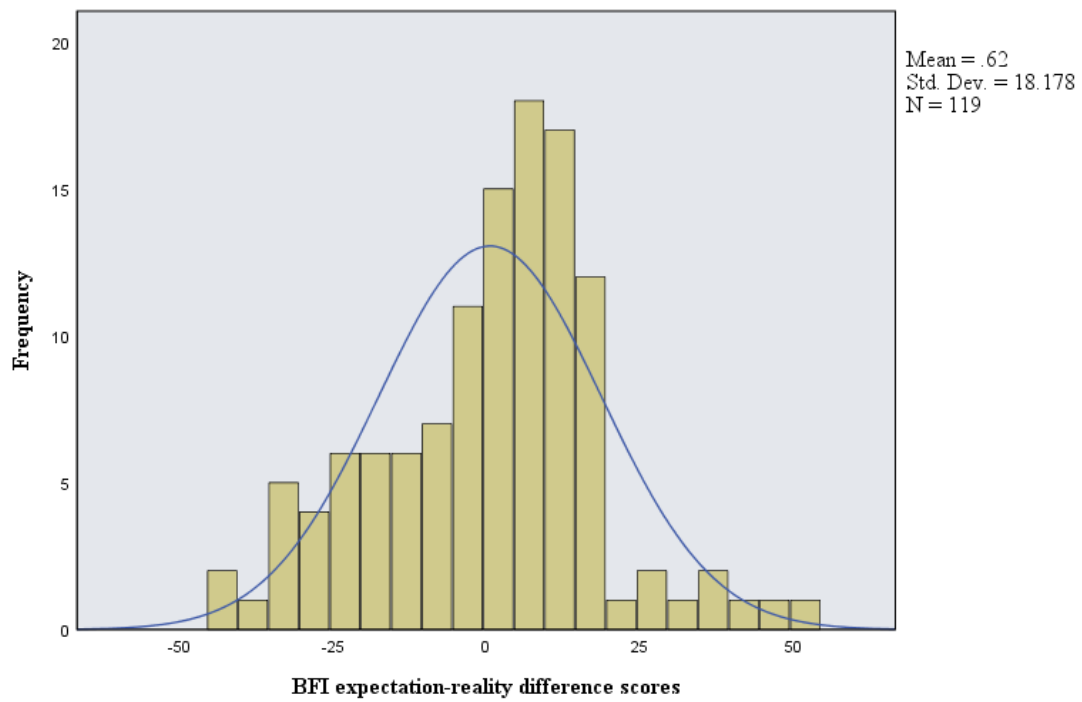


Figure 8. Distribution of BFI expectation-reality difference scores

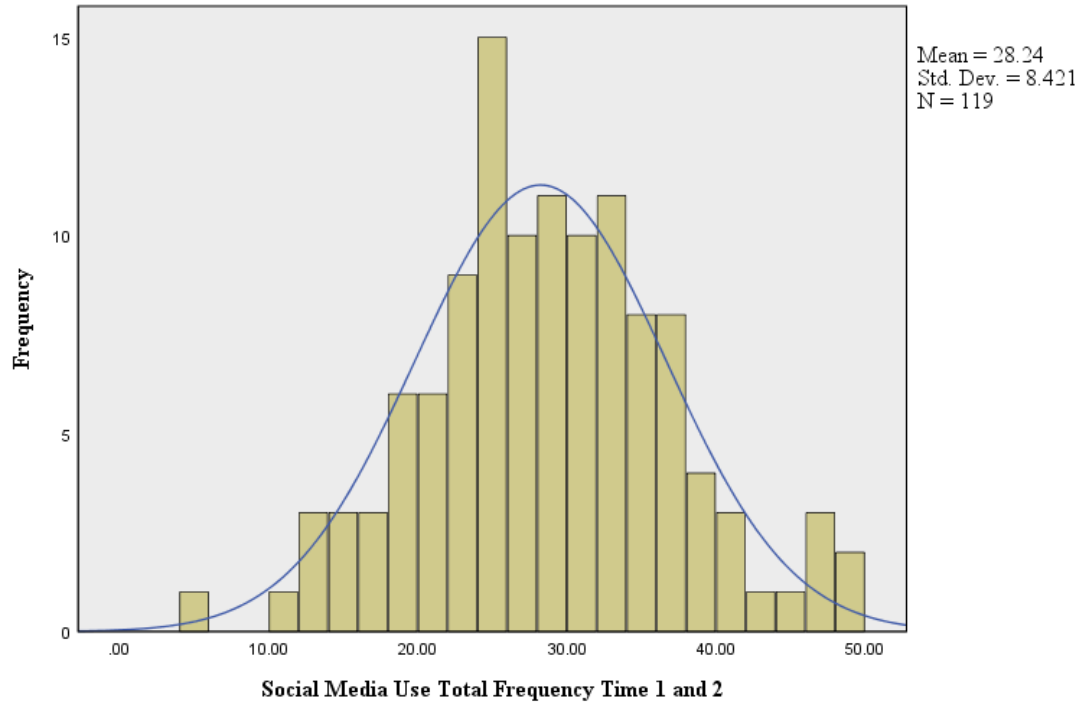


Figure 9. Distribution of Social media frequency of use total at time 1 and 2

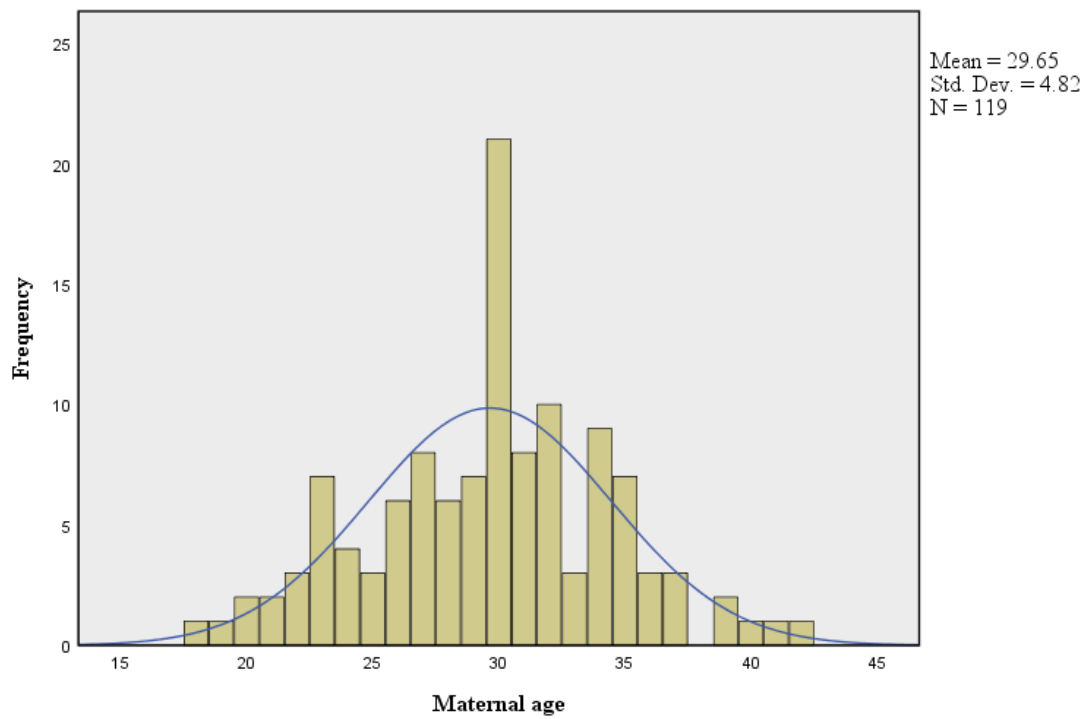


Figure 10. Distribution of Maternal age

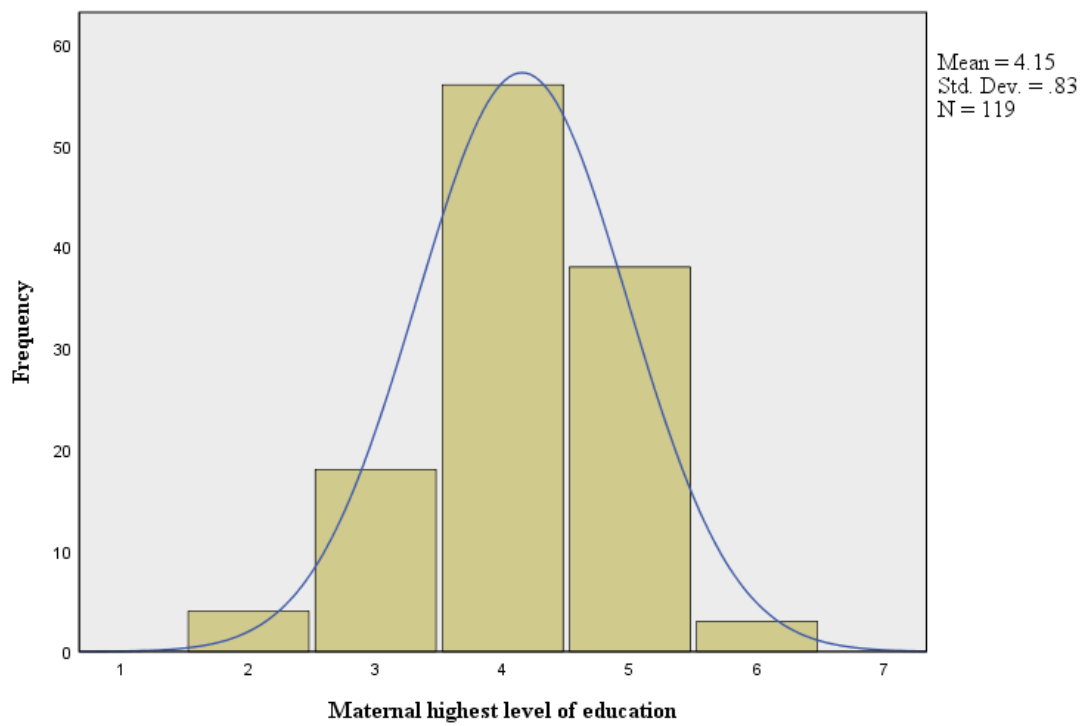


Figure 11. Distribution of Maternal highest level of education



## Appendix 18: Bivariate Associations

### *Bivariate Correlations for Continuous Variables in Analysis, n=119*

	1	2	3	4	5	6	7	8	9
1 EPDS T1	-								
2 EPDS T2	.53**	-							
3 GAD-7 T1	.77**	.51**	-						
4 GAD-7 T2	.41**	.80**	.51**	-					
5 BFI expectation-reality difference	-	-.18	-.20*	-.08	-				
6 Social Comparison T1	.37**	.40**	.29**	.40**	-	-			
					.03				
7 Social Comparison T2	.26**	.37**	.22*	.39**	.00	.64**	-		
8 Maternal age	-.18	-.14	-.21*	-.10	.09	-.06	-	-	
							.09		
9 Maternal education level	-.16	-.07	-.22*	-.12	.02	-.08	.04	.43**	-

\* $p < .05$ ; \*\* $p < .01$

### *Bivariate Associations between Continuous and Categorical Variables, n=119*

Variable	BIBG	n	Mean	Std Dev	t	p value
T2 GAD-7	Yes	51	2.07	1.23	0.76	.451
	No	68	1.90	1.10		
T2 EPDS	Yes	51	2.85	1.18	1.79	.076
	No	68	2.48	1.02		
T2 Social Comparison	Yes	51	6.03	0.55	-0.11	.91
	No	68	6.04	0.55		